AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING ENGINEERING • PRODUCTION • MANAGEMENT

OCTOBER 15, 1954

NATIONAL METAL SHOW NUMBER

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10,000 TONS AT A MILE A MINUTE!

...it will get where it's going a little sooner, a little safer, because this part pot the FULL HEALD TREATMENT

You're hitting the high iron at 60 per, with ten thousand tons of fast freight behind you. The huge, smoothly-purring diesels at your command have ample power and stamina to pull this tremendous load for hundreds of miles—with no interruptions, no unscheduled stops.

The tremendous power and long-haul dependability of modern diesel locomotives are a tribute to the skill and ingenuity of their makers. And precision finishing on Heald machines adds much to the stamina and perfect functioning of many vital diesel parts. Here, for example, is a piston pin carrier that is processed on all three basic Heald machines—as shown at the right.

Whenever a part is precision finished on Heald equipment you can be sure of three things. A finer, longer-lasting, precision made part. Important savings in time and

production cost. A definite competitive advantage for your product. That's why IT PAYS TO COME TO HEALD.



MACHINE COMPANY

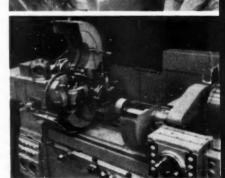
WORCESTER S, MASSACHUSETTS

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

Model 321 end loading Heald Bore-Matic is arranged to semi-finish piston pin holes in the farged steel carriers. Work is held in a two-station hydraulic clamping fixture and radial locaters are interlacked to insure proper location before machine is started.

Model 272 Gage-Matic Internal finish grinds the piston carriers. The work is held in an angle plate fixture with hand clamping; location is by pins in locating holes in piston carrier skirt. Workhead spindle positioning units are furnished so that loading will be from one position at all times.

Model 261 Rotary Surface Grinder finishes the shoulder of the piston pin carrier to provide flat smooth surface for locating on the insid-dome of the diesel piston. The work is held on a radial pole magnetic chuck with a retainer ring. Machine operates on a standard operating cycle.





EVERYWHERE-THEY GO!



turbockarged

Diesels

For greater power at lowest fuel cost—the Waukesha Turbo-supercharged 135-DKBS! It is a compact, powerful, heavy-duty, six-cylinder, four-cycle, full Diesel. The patented combustion chambers burn all standard "high-speed Diesel fuels" having cetane values of 45 or above. This powerful supercharged Diesel offers lively acceleration, clean burning, prompt starting, a tremendous reserve of power, and great overall economy.

The exhaust turbocharger system of supercharging affords a great increase in horsepower with a minimum of parasite load. Even without an intercooler the maximum power available from the Model 135-DKB Diesel Engine is increased from 147 hp. to 185 hp. at 2800 rpm. Without positive drive from the engine, the parasitic load decreases at part engine load, which improves overall fuel economy throughout the speed range.

Other advantages of the exhaust turbocharger are a relatively light and compact installation, flexibility in mounting, and the smoothing out of the exhaust impulses by the turbocharger turbine. Contributing to the Waukesha turbocharged Diesel's complete reliability and long-lived, trouble-free operation are time-tested and war-proved features developed in over 45 years of study and experience in building heavy-duty industrial-type internal combustion engines.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.

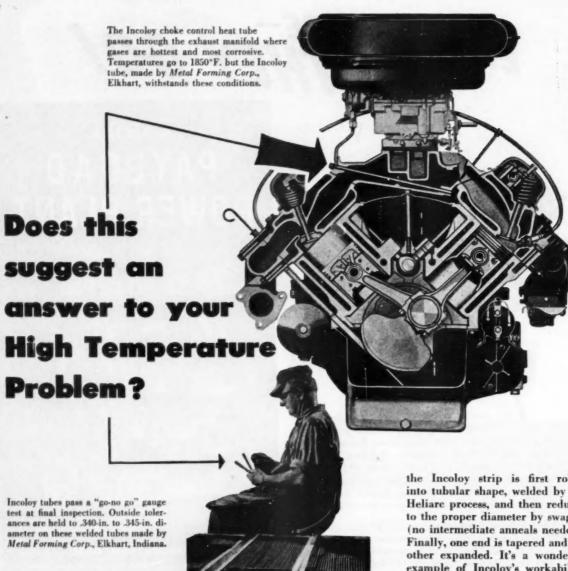
PAYLOAD POWER PLANT



135-DKBS TURBOCHARGED DIESEL—six cylinder, 41/4-in. x 5-in., 426 cu. in. displacement, maximum hp. 185 at 2800 rpm. Get Bulletin 1617.



THIS WAUKESHA 135-DKBS powered high-speed over-rihehighway rig operates in the Northern California-Oregon region.



The arrow you see points to an automatic choke heat control tube buried in the exhaust manifold. It pre-heats fresh air rushing to the choke thermostat and in operation it glows like the element of an electric stove.

Its inside wall is subject to oxidation; its external wall to the corrosive attack of 1850°F. exhaust gases. Yet it is relatively thinwalled (0.030-in.) for efficient heat transfer. What metal has the strength and corrosion resistance to withstand these conditions for the life of the engine?

To find out, six auto manufacturers independently tested several metals. All of the tests pointed to Incoloy as the practical answer. It had strength, resistance to oxidation and corrosion at high temperatures; and did not flake off oxide scale which could clog the choke thermostat. All six of these manufacturers now use Incoloy choke heat control tubes.

As for fabrication, at the Metal Forming Corporation, Elkhart, Ind.,

the Incoloy strip is first rolled into tubular shape, welded by the Heliarc process, and then reduced to the proper diameter by swaging (no intermediate anneals needed). Finally, one end is tapered and the other expanded. It's a wonderful example of Incoloy's workability.

Perhaps Incoloy or one of the other Inco Nickel Alloys has the right combination of properties to solve a metal problem of yours. Inco's Technical Service Section will gladly help you find out.

For a brief summary of the Inco Nickel Alloys and some of their industrial applications, write for "Standard Alloys For Special Problems."

The International Nickel Company, Inc. 67 Wall Street New York 5, N. Y.



Inco Nickel Alloys

Monel® • "R"® Monel • "K"® Monel "KR"® Monel • "S"® Monel Inconel® • Inconel "X"® Inconel "W" . Incoloy® Nimonic® Alloys . Nickel Low Carbon Nickel . Duranickel®

INDUSTRIES AUTOMOTIV

OCTOBER 15, 1954

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ABC

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Audit Bureau of Circulations

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Pangborn "Continuous-Flo" Barrel Cuts Blast Cleaning Costs More Than Half!

"Before and After" at Lefere

Cost of equipment	\$50,000 plus	\$29,670 total				
Operating cost per ton	\$1,25	60c				
Quality of job	Good					
Appearance	Duli	Sparkling				
Safety	Fumes, acid hazard	No hozards				
Convenience	Convenience Problem of protection, acid disposal					
Meintenance	Expensive	Greatly reduced				

Lefere Forge Co., Jackson, Mich., supplier for Ford, Budd Co., and many other automotive firms, is almost completely mechanized in operation . . . from the first step to the last, the work flows.

A key unit in this system is a Pangborn "Continuous-Flo" ROTOBLAST® Barrel. The Pangborn ROTOBLAST cleans 16 to 18 tons an hour . . . has cut cleaning costs over the pickling method formerly used from \$1.25 to 60c per ton! And, in addition to this great saving, the "Continuous-Flo" Barrel gives Lefere the bonus advantages listed at left.

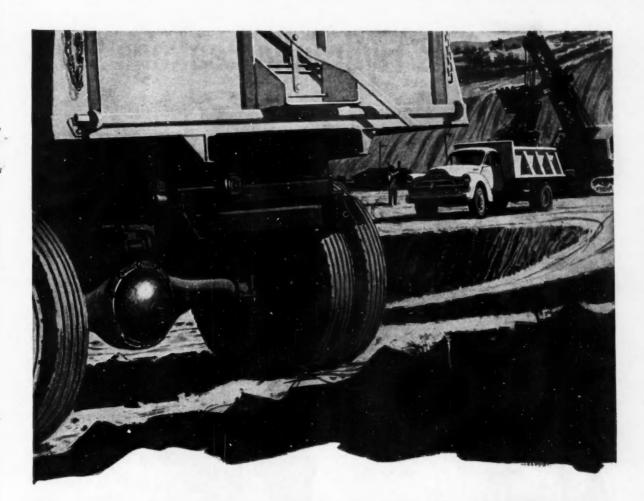
Get the Facts on Pangborn ROTOBLAST. Whether you pickle or clean with multiple batch equipment or tumbling mills . . . Pangborn has a ROTOBLAST machine to clean faster, better and cheaper. Bulletin 214 gives you full details. For your free copy, write: PANGBORN CORPORATION, 3900 Pangborn Blvd., Hagerstown, Maryland.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

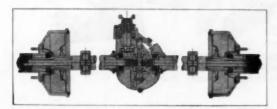


BLAST CLEANS CHEAPER

with the right equipment for every job



GLUTTONS FOR PUNISHMENT-CHEVROLET TWO-TONNERS with HYATT BARREL BEARINGS!



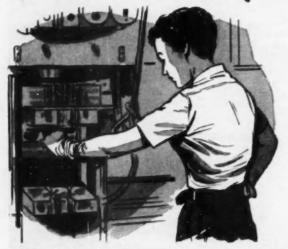
6 Barrel Bearings used in this Chevrolet 2-ton truck rear axle

Sheer stamina—the ability to "take it" year after year with minimum maintenance and maximum economy—has made this two-ton Chevrolet one of the world's most popular trucks. And in its rear axle—focal point for brutal punishment—you'll find six HYATT Barrel Bearings taking the brunt of it. Their ability to provide high load capacity with low friction—to automatically compensate for shaft deflection—has been conclusively proved in millions of miles of this troublefree truck service. If you have a similar bearing problem, take a tip from Chevrolet trucks—and hand it to HYATT Barrel Bearings—Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.



ROLLER BEARINGS

Suntac Cuts Hydraulic Leakage 90%



Hydraulic ram for injection molding press leaked excessively, using ordinary hydraulic oil. Make-up ran approximately 8 gallons per week.



Leaking oil dripped on hot platen and splashed onto operator, causing burns, spotted clothing, and generally untidy condition around the press.



Packings required changing at least once a month—frequent adjusting. Down time for maintenance seriously reduced productivity.



Changed to SUNTAC. Make-up oil now running only about ½ gallon per week. Operators are happier, and productivity greatly increased.

If you have a leaky hydraulic system, remember this: Suntac is the hydraulic oil especially compounded to reduce leakage. Special additives make the droplets cling together . . . keep them from leaking through packings. Experience has proved that Suntac will cut leakage an average of 35%. Get complete information about Suntac Hydraulic Oil from your Sun Oil Co. representative. Or write Dept. AA-10.

SUN OIL COMPANY



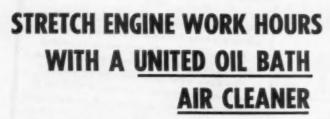
PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL Refiners of famous High-Test Blue Sunoco Gasoline

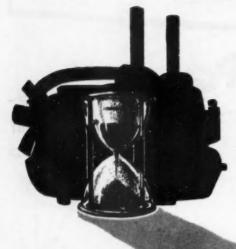


LINDBERG ENGINEERING COMPANY 2491 West Hubbard Street, Chicago 12, Illinois Les Angeles Plant: 11937 South Regentview Avenue, at Downey, California

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Associate Companies: Lindberg Industrial Corporation, Chicago, Illinois
EFCO-Lindberg, Ltd., Montreal, Canada

Lindberg Italiana, Milan, Italy





You can add hundreds of hours of operation to an engine by installing a United Oil Bath Air Cleaner. Here's why. Efficient United Air Cleaners prevent over 99 percent of airborne dust from entering the engine — protect rings, pistons, sleeve bearings from excessive wear.

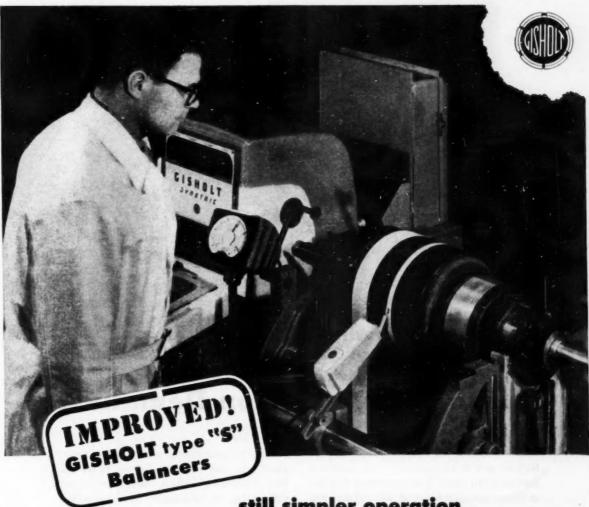
Back of United are over 30 years of air cleaner experience. Time-tested United Oil Bath Air Cleaners have proved their worth on thousands of diesel engines used for powering trucks, tractors, road machinery, stationary and portable power units.

Experienced United Specialties sales engineers can help you with up-to-the-minute counsel on problems relating to the design and use of oil bath air cleaners. Write for complete details.

UNITED SPECIALTIES COMPANY

United Air Cleaner Division — Chicage 28 — Mitchell Division —

AIR CLEANERS * METAL STAMPINGS * ROLLED SHAPES IGNITION AND TURN SIGNAL SWITCHES * DOVETAILS



still simpler operation with fewer controls...easier readings

Yes, we've made it possible for you to handle all balancing faster and easier than ever before.

On these improved Type "S" Balancing Machines you have but two operating controls, one for indication of amount and location of required correction in each plane. Amount and location of correction are shown simultaneously—on a uniformly gradu-

ated scale with large, easy-reading pointer and dial.

These are a few of the new features which years of broad production and maintenance experience have proved desirable. And Gisholt, always first in balancing, is first again to bring you new standards of performance.

The improved DYNETRIC Type "S" Balancing Machines are offered in both horizontal and vertical models, capable of balancing workpieces ranging from a few ounces to several hundred pounds.

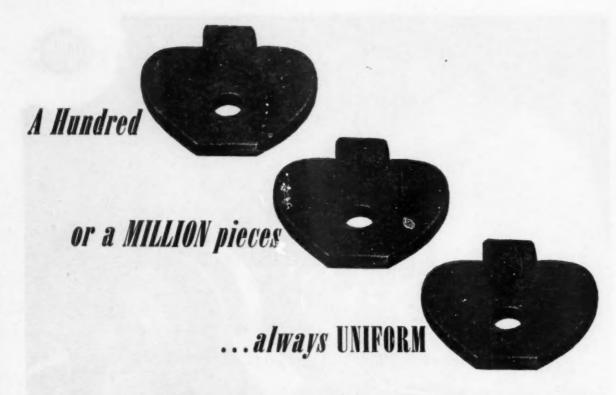
Why not get complete details?

GISHOLTPANY

Madison 10, Wisconsin



TURRET LATHES . AUTOMATIC LATHES . SUPERFINISHERS . BALANCERS . SPECIAL MACHINES



Cut to Your Precision Demands!

When Western Felt cuts a component part to your specifications, piece after piece is a precision-cut part. You want that kind of uniform precision because the performance of your product depends upon it. And because of the peculiar properties of wool felt fibres, especially where the more dense types are specified, it can be processed with amazingly close tolerances. Tolerances as close as a few-thousandths of an inch can be supplied when required.

Western Felts are manufactured to the density you require—cut and supplied

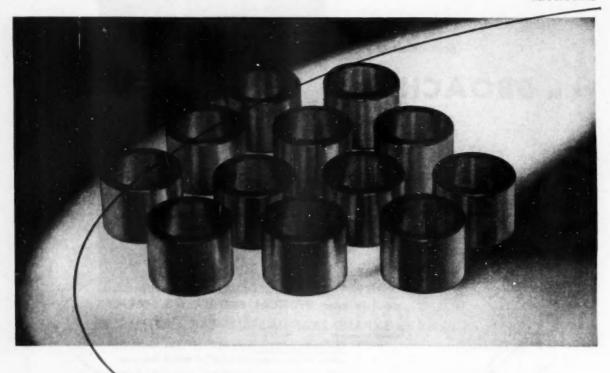
exactly to your specifications. They resist wear, age and weather...never ravel nor fray. They seal, insulate, absorb sound and vibration, or lubricate...as you wish! Chemically treated, they can be mothproof, mildew-proof, flame or water resistant.

You name it...specify it...we put the benefits of 54 years of experience back of making a felt component that will meet your specifications. Write today—your inquiry will receive prompt attention.



Manufacturers and Cutters of Wool Felt





these requirements in mind...

So varied are the demands on multiple spindle automatics it is impossible to design into one model — or a number of models — all the facilities that will satisfy every requirement. To excel in any range of work the design of a machine of this type must be directed toward that work.

Cone's new General Datalog lists over forty CONOMATIC models that are designed with these requirements in mind. For any range of work, Conomatics are built to more efficiently serve the latest cutting tool materials.

data for comparison

Part	Bushing
Machine	1%" Six Conomatic
Tools	100% Carbide Tipped
Material	Stainless Steel Tubing
Stock Size	1%" 00; %" 10
R. P. M.	Wark Spindle — 1033 Opposed Spindle—1048
Time	5 7 Seconds per Cycle



Conomatic | CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.





It has to be accurate



Specify Brainard FOR WELDED STEEL TUBING

• Brainard welded tubing is an economical structural material, and offers many physical advantages. It has a smooth exterior, with all weld flash removed. Its wall thickness is uniform, since it is formed from flat strip. With welded tubing you can cut weight without sacrificing strength. And there's practically no limit to the design requirements you can meet with this easily fabricated material.

Brainard maintains continuous quality control throughout manufacture—from ore to finished tubing. Careful supervision assures you high quality. For complete specifications call or write Brainard Steel Div., Dept. W-10, Griswold St., Warren, O.





Stout "hearts" for new Navy sub killers

Patrolling endless seas in search of enemy subs . . . blasting them out of action with newest destruction devices . . . this Grumman S2F-1 "hunter-killer" depends on the stamina of twin Lycoming-built engines to keep it high and dry.

This is another Lycoming contribution to aviation progress. For Lycoming engines also fly military missions in aircraft ranging from liaison planes to trainers to helicopters. They have distinguished themselves in civilien aviation, too-particularly in single- and twin-engine planes.

Do you need this kind of dependable air-cooled power .. or any of the diversified services listed above our signature? Whatever your problem . . . look to Lycoming! air-cooled engines.*



Send for free booklet! "THE LYCOMING STORY"... 40 interesting, illustrated pages showing many ways Lycoming is ready to help you. Write for it on your letterhead.

Aircraft Engines Industrial and Tank Engines Engine Overhaul Generating Units

Turbine Engineering and Research Engineering Design and Development Hardened and Ground Precision Parta Gears and Machine Parts

Complete Assemblies Heat-Treating and Plating Steel Fabrication Castings Boilers

automotive and aviation executives please note.



knurled...

78% faster







When Whitin Machine Works, Whitinsville, Mass., applied their 15/8" standard Vers-o-tool to one-pass knurling this textile machine part (7" long, B-1113 steel), they stepped up former production from 72 to 128 pieces per hour.

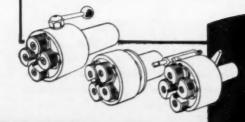
They get a higher quality too, because the 4-cutter Vers-o-tool head opens instantly at the end of the cut and pulls back fast without contact to damage the sharp knurl. Thousands of different jobs are run every day with standard Vers-o-tools equipped with multiple chasers or cutters such as those shown at the left.

Most of these simple, rugged heads are used for threading, equipped with the long lived Ground Thread Circular Chasers—most economical for long runs—or with the lowercost Adjustable Blade Ground Thread Chasers for smaller lots. All guarantee Class 3 or pressure-tight quality threads—and smoother.

Conversion from Circular Chaser threading to any other type multiple cutters is simple: you change only the cutters and blocks—all types of which are interchangeable, head size for head size, for revolving or non-revolving heads. Vers-o-tool capacities range from .056" to 6½".

Ask us to show you how standard VERS-O-TOOLS can step up your OUTPUT, guarantee ACCURACY, reduce your TOOL INVESTMENT and your OPERATING COST. Ask for catalog DT-52.

24-hour deliveries on standard stockable MC and NF chasers and blocks. Also National Taper Pipe and Dry Seal.



The NATIONAL ACME COMPANY

170 EAST 131st STREET . CLEVELAND 8, OHIO

ACME-GRIDLEY BAR and CHUCKING AUTOMATICS 1-4-6 and 8 Spisalle • Hydraul Thread Rolling Machina • Automotic Threading Dies and Tops Limit, Mater Starter and Centre Starless Switches • Sciencids Countral Macofacturing.

We Built a Reputation...

PRATT & WHITNEY KELLER MACHINES

MÖRE EFFICIENT than over before

With a work area of 36" x 20", the Type BL Keller is ideal for a wide variety of smaller jobs. Both single and 3-spindle models are manufactured. Other Keller Machines accommodate practically any required work size up to 20 feet horizontally by 7 feet vertically.

"KELLERING" means ...

Throughout industry, use of the P&W KELLER MACHINE to produce complex 2- and 3-dimensional forms by tracer-controlled milling has become so popular and so wide-spread that this type of machining is universally known as "Kellering."

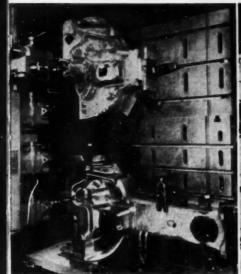
Yes, we at Pratt & Whitney are proud of this recognition and reputation. But we also know that reputation and past performance alone aren't enough to insure your continued profitable operation in the face of increasingly competitive markets and constantly rising production costs.

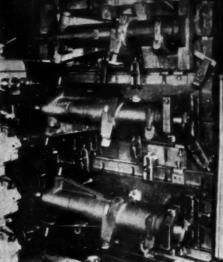
For this reason, we have carried on a program of continuous research, development and improvement. As a result, P&W Keller Machines — always outstanding performers — now offer the increased speeds, feeds and inbuilt efficiency to meet today's demands for still greater productivity. In many applications, actual on-the-job performance has proved that Keller Machines are now more than twice as fast as older machines or older methods.

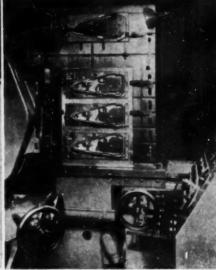
- FAST, ECONOMICAL REPRODUCTION OF COM-PLEX SHAPES . . . that cannot be machined economically by any other means.
- AN UNLIMITED VARIETY OF JOBS WITHOUT 'EXPENSIVE ATTACHMENTS . . . because P&W Keller Machines are designed and built specifically for tracercontrolled milling, not just adapted.
- RUGGED DEPENDABILITY . . . Kellers stay on the job year after year without frequent or expensive maintenance.
- ELECTRIC TRACER CONTROL . . . that is dependable, relatively simple, retains high initial accuracy without complicated adjustment. *Profiling* to a pre-set depth following an outline template . . . or 3-dimensional milling following a full model.

but We're Not Resting on it!

ALL THESE JOBS . . . DONE QUICKER, BETTER







PHOTOGRAPHS COURTESY OF MPM INC., CLEVELAND, OHIO.

DIES, MOLDS AND METAL PATTERNS

The complex 3-dimensional shape of a plaster model is duplicated in a large brass casting to produce a pattern for a railroad coupling. Using only one of its 3 spindles, the Keller Machine easily accommodates this large workpiece.

PROTOTYPE AND PILOT PRODUCTION

Producing parts for aircraft landing gear, this P&W Keller Machine mills two steel forgings simultaneously. The exact shape of the mahagany model shown at the top is accurately duplicated with speed and economy.

PRODUCTION MILLING AND PROFILING

Precision profiling 3 aluminum alloy castings at a time, this P&W Keller 3-Spindle Machine economically makes production runs on aircraft ribs. The model, in this case, is an inexpensive, 2-dimensional steel template.

Maintaining Your Reputation

. . . and your profits demands constant progress and improvement with a well conceived program of replacement and modernization. Plan to include new P&W Keller Machines in your program . . . benefit by the added productivity they

can bring to today's and tomorrow's jobs. Write to the P&W Branch Office nearest you . . . or direct to West Hartford . . . for your free copy of Circular No. 490-3 that fully describes the Type BL Keller Machine.



PRATT & WHITNEY

WEST HARTFORD 1, CONNECTICUT, U. S. A.

First Choice (1) for Accuracy



more dependable starting under all operating conditions

"No Kick-Out" feature sets new standards in starting performance.

Since the earliest days of the automotive industry Bendix* Starter Drives have been noted for reliable starting.

Now with the new and latest Bendix Folo-Thru Starter Drive, starting, even under the most adverse weather conditions, has been improved immeasurably.

Although this new Bendix Starter Drive is fundamentally similar to its illustrious predecessors, it is specially designed to follow through the weak explosions until the engine actually runs on its own power.

That's why cars, trucks and buses equipped with the Bendix Folo-Thru Drive are easier and quicker to start under all operating conditions.

ECLIPSE MACHINE DIVISON OF

Bendix

ELMIRA, NEW YORK

folo-thru Bendix

starter drive

COSTS less —The new Folo-Thru Drive requires no actuating linkage and the less expensive solenoid may be placed in any convenient position. Results are lower installation costs and no adjustments. Complete detailed information is available on request.



Bendix Folo-Thru Starter Drive Bendix Automotive Electric Fuel Pump Stromberg Aeroquad Carbureter







in APPLIANCE CLUTCHES . . .

cork facings give low-cost, trouble-free performance

If you want clutches that deliver dependable performance for the life of an appliance—yet cost less to manufacture and maintain—you should investigate cork clutch facings.

Cork has a high coefficient of friction, even when immersed in oil. Therefore, it's normally possible to use fewer or smaller plates or reduce engagement pressure and still get the desired torque capacity.

In a properly designed wet clutch, cork facings engage smoothly and operate quietly. Wear on facings is very slight, and there are no damaging particles that can be released into the oil. Since cork is resilient, facings conform to opposing plates perfectly.

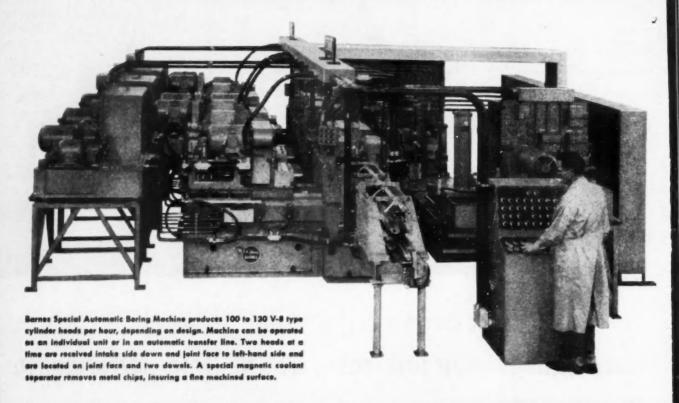
A good example of cork's advantages is found in the experience of a manufacturer of well-known automatic washers. When he switched from stamped metal plates to cork facings, he solved his major clutch production and service problems. Until he made the change, his clutches required a preliminary break-in period plus a draining and refilling of the oil. Even with this precaution, abrasive particles continued to damage gears and facings, causing clutches to fail. Service and replacement costs were excessive.

When he substituted cork, clutch service calls and replacements were virtually eliminated. And because of cork's high torque capacity, it was actually possible to use only *three* cork-compounded facings in place of the original *eight* metal friction surfaces.

Perhaps cork's high torque capacity and dependable performance can help your clutches work better, too. Tell us your application—appliance, automotive, business machine, or industrial equipment—and we'll gladly help you choose the most efficient cork facings for your clutches. Write Armstrong Cork Company, Industrial Division, 7210 Irvin Street, Lancaster, Pennsylvania.



Austouricing NEW MACHINING AUTOMOTIVE



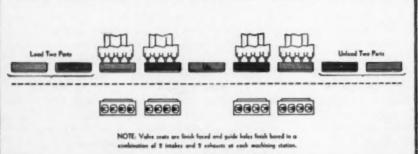






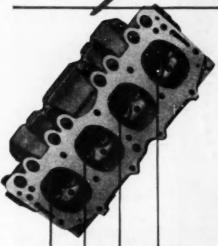
Diagram above illustrates how heads are transferred two at a time and machining operations arranged to meet high output requirements. For lower production, machines are designed with fewer machining stations and one-station transfer unit. Closeup of 4-spindle head with special tests for machining feur valve seets and stem hales in one pass. Second 4-spindle head completes remaining operations.

Builders of Better Machines Since 1872

MULTIPLE SPINDLE DRILLING . BORING . TAPPING

PRECISION METHOD OF FINISH VALVE SEATS AND STEM HOLES

Automatically



Cylinder head for V-8 engine showing finish machined valve seats and guide holes. Red arrows indicate operations performed at first machines states.



Concentricity of valve sent and stem hale held to .0005" total indicator reading.

EXCLUSIVE W. F. & JOHN BARNES MACHINING DEVELOPMENT HOLDS TOTAL CONCENTRICITY WITHIN .0005"

Now, a new precision machining method developed exclusively by W. F. & John Barnes makes it possible for you to finish machine automotive valve seats and stem holes on a continuous automatic basis. You can now eliminate corrective operations after normal boring, reaming, and seating operations, because this new development holds total concentricity within .0005" (total indicator reading). This new machining process, as incorporated into Barnes Automatic Progress-Thru Type Machines, consists of multi-blade tooling for the valve seating operations, combined with modified gun drilling tools for precision boring valve guide holes. Production tests show the valve seat tools produce 10,000 to 15,000 parts, and the boring tools, between 2,500 and 4,000, before regrinding or replacement is necessary. The net result has increased production efficiency and improved product quality at lower cost. Write for more facts today.

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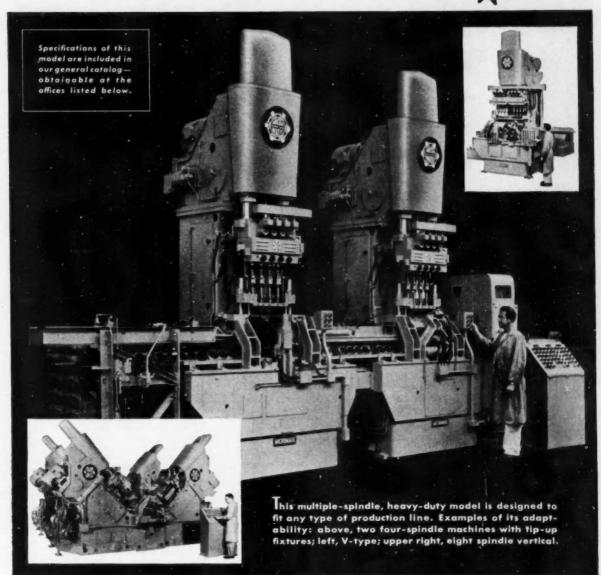
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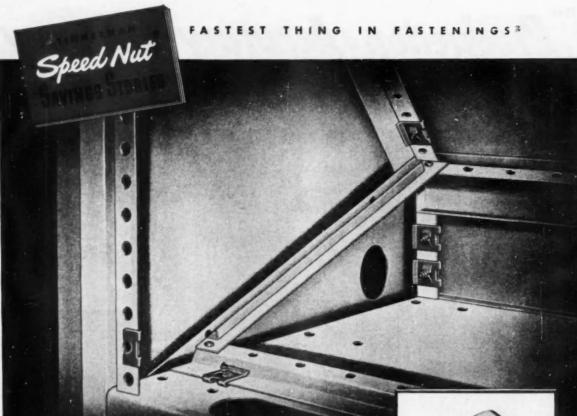
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The basic Emcor console requires 276 mounting holes for various assembly arrangements. Formerly, each hole was tapped . . . tight tolerances and paint clogging presented a costly problem. Now, the use of 40 "J" Type Speed Nuts makes it unnecessary to tap the holes. Speed Nuts provide the right amount of float, eliminate the problem of paint clogging, and furnish an attachment $3\frac{1}{2}$ times stronger than the former fastening method. And they can be easily moved from hole to hole, wherever attachments are to be made.

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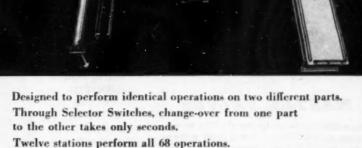
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Made in 11 bore sizes from $1\frac{1}{2}$ " to 14"...13 standard mountings...many combinations. Extremely close tolerances insure accurate, easy mounting. Steel heads. Cylinders of hard-drawn, high strength brass honed to a satin finish. Piston rods ground and polished then hard chrome plated for extreme smoothness as well as corrosion resistance.

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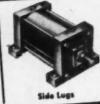














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Bronze discs lapped to perfect seal with seats. Packless design. For hand, foot or electrical operation.

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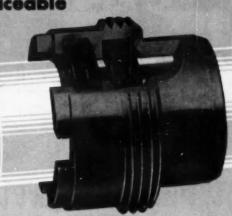
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Made in 9 bore sizes from $1\frac{1}{2}$ " to 8"...13 standard mountings...many combination mountings. Extremely close tolerances for easy mounting. Heavy-duty the rods. Steel heads. Steel cylinder bodies "Tru-Bored" and honed to a satin finish. Piston rods ground and polished then hard chrome

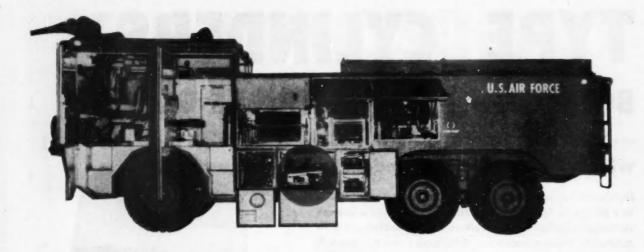




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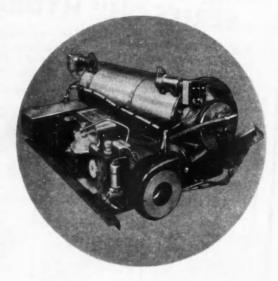
everything has to work ... and it does



Test personnel of the Air Proving Ground Command recently returned after more than 1000 hours of Operational Testing on the Type 0-11A USAF Crash Truck built by American-LaFrance-Foamite. A Janitrol 90,000 Btu/hr. Liquid Heater is standard equipment on this all-weather vehicle, and supplies all heating requirements.

No difficulties of any kind were experienced with the Janitrol heater in the 0-11A Crash Truck during the entire artic test period. Not once was any service necessary! Defrosting of the windshield was adequate with the assistance of the wipers in combatting the after-squirt from the turret dispenser nozzles. In a minus 41°F ambient temperature cab comfortization was maintained at plus 66°F, and in addition the Janitrol Heating Unit provided standby heat for the vehicle engine, pump engine, hose reel compartments, battery compartment and auxiliary power generator compartment. The main water storage tank was protected from freezing by a heat exchanger submerged in the tank.

No matter what kind of heat you may need-specify "Janitrol" and be sure of performance and dependability.



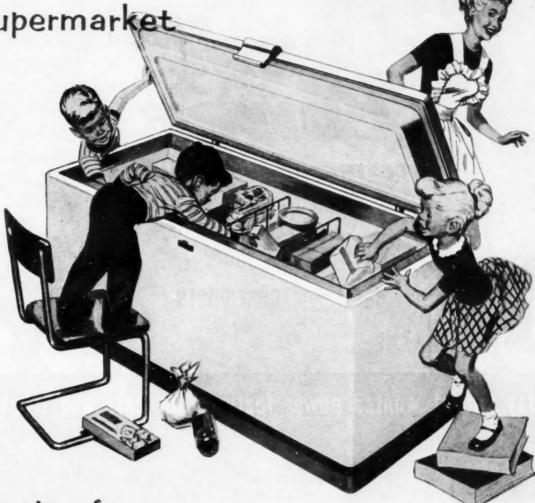




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Bendix * low pedal POWER brake

Specified by more car manufacturers than any other make, Bendix Low Pedal Power Brake makes possible quick, sure stops by merely pivoting the foot from stop-and-go controls. No need to lift the foot and exert leg power to bring the car to a stop. Result—more driving comfort, less fatigue and greater safety!

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POWER brake

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With one simple compact unit, Bendix Air-Pak combines all of the well-proven advantages of hydraulic brake actuation with an air brake system. An important advantage of Air-Pak is that brakes can be applied by foot power alone when braking is required before air pressure builds up or if it should fail for any reason.

*REG. U.S. PAT. OFF.

The term "Bendix Power" not only identifies the industry's outstanding power braking and power steering equipment, but describes the unmatched engineering and manufacturing resources behind these products.

It is well that Bendix Products Division be

thought of in this dual capacity, for the outstanding acceptance of Bendix power units stems largely from the fact that industry has learned over the years to look to Bendix for the latest and best in power equipment for cars, trucks and buses.

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High Spots of This Issue

* Flame Hardening Applied to Crankshaft Bearing Areas

Increased hardness was the main spur in Chrysler's adoption of flame heating with subsequent quenching for multi-cylinder engine crankshafts. Outlined here are the techniques involved and the resulting advantages. Page 48.

* Coordination—Key to Successful Volume Manufacturing

The dominating importance of teamwork in automotive operations, so clearly pointed up in two previous articles on coordination is re-emphasized in this piece. Its vital role in a number of companies is demonstrated. See Page 52.

* Studebaker Offers Two Higher Horsepower Engines

As styling changes are rather few, the Studebaker story for 1955 revolves principally around the more potent powerplants introduced and the new President model. The mechanical features are given special attention. Page 58.

* Automatic Controls Take Over

Of all the elements hastening the arrival of the nearly "automatic" factory, none could be called secondary to the vast number of new control devices. This fascinating field and its future are surveyed here. Page 62.

New French Fords Have Long-Stroke V-8 Engine

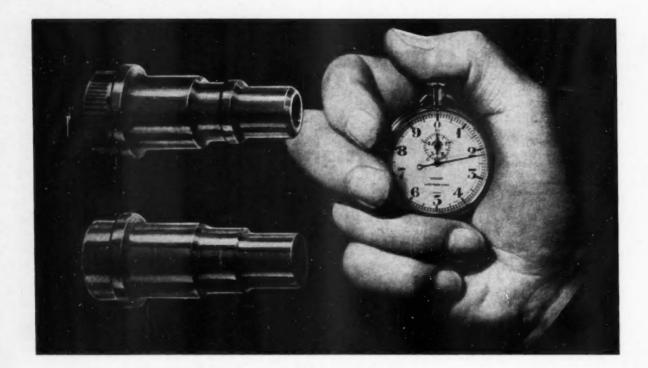
Bound to capture much interest at the forthcoming Paris show, the Ford of France line for 1955 incorporates a number of new features, such as the unique Aquillon V-8 engine. A complete description is furnished. Page 72.

★ 55 New Product Items
And Other High Spots, Such As:

Human engineering in aircraft design; thin wall ducting in jet engine planes; Reo adds two V-8 truck engines; preview of National Metal Show; what's new at the Metal Show; flow coating in aircraft paint shop; and two U. S. car makers seek plants in Brazil.

Automotive and Aviation News, Page 33 Complete Table of Contents, Page 3

PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTERANCE EQUIPMENT • PRODUCTION • MANAGEMENT



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By the time the B-1113 piece was finished, you'd be halfway through a second Ledloy piece. Such greater speeds and feeds are possible with Ledloy because Ledloy contains a built-in lubricant which substantially reduces the friction between the steel and the cutting tool.

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Ryerson Ledloy machines up to 50% faster than B-1113 . . . tool life is extended as much as 200% . . . and net savings of 25% and more are effected. And Ledloy machines to an unusually clean, smooth finish-case hardens effectively -and bends, crimps, swedges or rivets easily.

Ask your Ryerson representative for the facts about Ledloy or write us direct for engineering data. Ryerson was the first to stock Ledloy and today your nearby Ryerson plant carries the world's largest stocks of Ledloy rounds, squares and hexagons in a wide range of sizes for immediate shipment when you call.

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Zews of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 111, No. 8

October 15, 1954

Studebaker Price Cuts Unlikely To be Followed by Others Soon

Studebaker's price cuts of \$37 to \$287 on 1955 models is unlikely to touch off price slashing among other companies. Studebaker won pay cut concessions from labor and is forced to make good on a vow to become "more competitive.

Many other companies, unlike Studebaker, have a huge tooling bill for major changes and see no possibility of price cuts now. However, a few might make adjustments later to get in line competitively. There is also a possibility that some makers may throw in optional equipment at no extra price on 1955 models.

The biggest reduction by Stude-baker, the first automobile manufacturer to introduce 1955 models, is on the Commander Regal hardtop convertible, which has been slashed from \$2502 to \$2215. The smallest cut was made on the Champion deluxe station wagon, down from \$2187 to \$2150. All prices are factory delivery prices, which include Federal taxes and handling charges.

Chrysler Gets Tank Order; Also Tools Up for Missiles

Chrysler Corp. has clarified a report that the corporation has been awarded a \$22 million contract for guided missile work. The assignment given to the corporation last month by the Army is an "extension" of a multi-million contract granted Chrysler in July, 1953, for research and development on guided missiles. Amounting to \$855,000, the latest extension brings the total of recently awarded contracts to Chrysler for tooling alone to \$2.275 million.

Production of the missiles will be started in the Navy-owned jet engine plant in Warren Township near De-



AUSTIN SEDAN WITH CHOICE OF TWO ENGINES

The new Cambridge saloon is said by Austin Motor Co., Ltd., to be designed for the individual requirements of motorists throughout the world. Alternative specifications offered are: 73.17 cu in. (A40) or 91.46 cu in. (A50) engine; two or four-door body; 11 different color schemes; "family" or "de luxe" models; and a wide range of optional extras. Both the A40 and A50 engines are four-cyl types and have maximum outputs of 42 bhp at 4500 rpm and 50 bhp at 4400 rpm, respectively. Wheelbase is 8 ft, 31/4 in.; length, 13 ft, 61/4 in.; width, 5 ft, 111/2 in.; and height 5 ft, 11/2 in.

troit "as soon as practicable." Called the "Redstone," the new weapon is a long range, ground-to-ground artillery type of missile.

At the same time, Chrysler revealed that it was awarded a \$160,-601,200 contract to build the Patton M-48 medium tanks. The award is part of a \$266 million vehicle procurement program announced by the Army last July.

Chrysler won the contract by underbidding the Fisher Body Div. of General Motors Corp. by \$7.6 million. American Locomotive Co. was the third and highest bidder.

Chrysler will produce the tanks at its Newark, Del., plant, where it previously made medium tanks, and the engines will be turned out at the Continental Motors Corp. plant in Muskegon, Mich. The order calls for 1800 tanks, and Chrysler may start production by February.

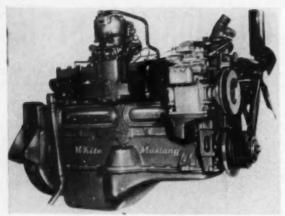
Nash Ups Daily Output Of Ramblers by 100

Nash increased production of its Rambler automobiles from 270 units a day to 370 at the Kenosha, Wis., plant. The production boost resulted in the addition of 800 workers on Oct. 11 to increase total employment at the plant to 5300.

Two Car Makers May Offer Fender-Mounted Mirrors

Front fender-mounted, rear-view mirrors may be the next automobile accessory up for revival. Two large companies are looking at one as a possible dealer accessory. Mounted just back of headlights, it is a convex unit mounted on a spring-loaded standard to give hinge action under impact and to return automatically to upright position.

Mews of the AUTOMOTIVE



WHITE ENGINE FOR AUTOCAR

Newly designed for use in Autocar gasoline - powered truck and tractor lines is the six-cyl, 200-hp White Mustang engine. Known as the 390-A, it has domed-shaped pistons with better combustion, higher power ratio, and more power-perpound, according to Autocar. Compression ratio is 6.4 to 1.

Striking Union Sued t

In its first difficulty with the union since it became a corporate firm last May, American Motors Corp. has filed a suit for \$888,135 against the Mechanics Education Society of America. The litigation is AMC's answer to a \$2.538 million suit filed by the mechanics union, which has been striking against the company's Detroit Kelvinator plant since Aug. 2. It asks continuing damages of \$10,100 for each additional day of the walkout.

By American Motors

American Motors charges that the strike is illegal, and alleges that MESA has entered into an illegal agreement with the AFL unions to prevent equipment from being moved from the Plymouth Rd. plant in Detroit to its Grand Rapids, Mich., unit, where the company is transferring some appliance production.

The union claims the company had no right to shift this work. AMC, on the other hand, claims it has complied with the union contract and that the union has no right to tell the company what products it will make or where it will build them.

\$35 Million Tank Order Is Given to Cadillac

Cadillac's Cleveland plant, which had its monthly tank production rate cut earlier this year, has been awarded a \$35 million contract for M-42 tanks for the Army. Production on the vehicle is expected to start next June.

A sister vehicle of the M-41 light tank which Cadillac has been producing, the M-42 can be produced on the same assembly line, since it has many of the same components as its predecessor. The M-42 carries twin 40-mm guns.

Car Dealers Study New Contract Clause

Territory protection for car dealers is getting some attention from NADA, which has again polled its members on their preference for such a clause in dealer franchises. Results show about 55 per cent in favor of the proposal, a direct reversal of last year's straw vote when 54 per cent were against it.

The margin still is narrow, however, and NADA is undecided whether to press for action. Even so, prospects for necessary Justice Dept. approval or a special law giving anti-trust immunity are not bright.

1898 Autocar Presented To Henry Ford Museum

The first four-wheel car built by Louis S. Clarke, founder of the Autocar Co., has been presented to the Henry Ford Museum. The vehicle is an 1898 Autocar, one of the oldest automobiles still in running condition. It joins the museum's collection of 180 antique cars.

Railway Express Places Order For 3000 New 11/2-Ton Trucks

Purchase of 3000 new 1½-ton pickup and delivery trucks by Railway Express Agency, Inc., at a cost of \$9½ million has been announced. The new units, many of which are expected to be put in service before the year-end in the District of Columbia and 65 other cities in 30 states, are being custom-built to the express agency's specifications.

The four manufacturers supplying the truck-chassis equipment are: Fargo Motor Div. (Dodge) of Chrysler Corp.; Ford Motor Co.; General Motors Corp.; and International Harvester Co. Specially designed truck-bodies to complete the unit are being built by: Gerstenslager Corp.; York-Hoover Body Corp.; and Metropolitan Body Corp.

Approximately one-third of the new trucks will be equipped with four-speed GMC automatic transmissions, while other units will use the standard three-speed, steering post shift. Powered by six-cyl engines, the new trucks will be equipped with power brakes, automatic directional signals, dual rear wheels, and posture-type driver seats.

1955 Automobile Show Slated For Jan. 8-16

Now that 1955 automobiles are rolling off the assembly lines, Chicago is once again to be the stage setting for displaying all of next year's models. The 1955 automobile exposition in that city, regarded as a national automobile show, will be held from Jan. 8 through 16 in the International Amphitheater.

The entire second floor and part of the first floor will be devoted to displays of the new models, which will include 18 makes of cars and eight makes of trucks. Plans for special exhibits of accessories, parts, equipment, and educational displays are well underway.

As in previous years, the 1955 exposition will feature a stage revue glorifying the new cars. The Chicago Automobile Trade Association, sponsor of the show, predicts an attendance of close to a half million.

AND AVIATION INDUSTRIES

Studebaker-Packard Borrows \$25 Million for New Operation

Indicative of the high hopes newlyformed Studebaker-Packard Corp. has for gaining a larger share of the automotive market next year is the announcement that the corporation has borrowed \$25 million from three insurance companies for its new operation. In addition to the loan, the corporation has made a \$45 million credit arrangement with 21 commercial banks.

With the new financial plan, reduced car prices, and a concession made by the union earlier to take a cut in incentive pay, the corporation hopes that it will be able to almost double its present share of the market. The combined market share of Studebaker and Packard prior to the official merger of the two companies on Oct. 1 stood slightly under 2½ per cent.

Studebaker had been operating on a part-time basis from January to August on one shift. Corporation officials seem confident that production will soon warrant a two-shift day. Present production schedules call for 15,000 vehicles during October, but this figure is expected to be boosted to 30,000 units a month eventually.

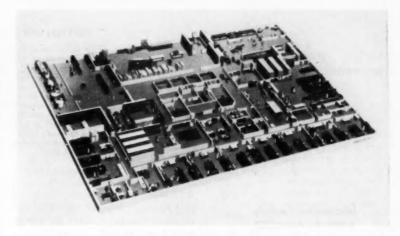
Piston Rings of Powdered Iron Readied for Market by Muskegon

Muskegon Piston Ring Co. is making plans for production of automotive piston rings from powdered iron. The announcement climaxes an intensive two-year program of production and testing, following more than 10 years of research.

New machinery is now being installed, and samples of Muskegon's powdered iron automotive piston rings will be available in the next two months. The company states that it has road-tested the new piston rings more than 75,000 miles.

It is expected that the new thinner rings will meet requirements in strength and elasticity as well.

According to Muskegon, the powdered metal and sintering techniques it has developed give the powdered iron ring a sizable increase in tensile strength.



OAKITE RESEARCH FACILITIES SPARKLE

Depicted here is a cutaway view of the new laboratory facilities of Oakite Products, Inc., in New York City. Individual sections, devoted to various types of research, run from center left across the bottom of drawing. Pilot plant and the exhibit and engineering departments are at top, while customer service laboratory is at center right. Wet-testing rooms, storage areas, conference rooms and offices are grouped in center at the area for convenient accessibility and operating efficiency.

Chrysler Will Offer Tubeless Tires in '55

Chrysler Corp. has announced that it will offer tubeless tires as standard equipment on its 1955 models at no extra cost. The news confirms reports that all car makers probably will have that type of casing next year.

Packard in July was the first car company to announce adoption of tubeless tires. Studebaker also will make them available. It now is fairly definite that all other car manufacturers will equip their 1955 cars with tubeless tires.

Olds Production May Come Near Record

While total production of automobiles this year is behind that of 1953, many car companies are breaking individual records. Producing at a fast pace during the last few months, Oldsmobile expects to wind up 1954 near the record it established in 1950, when it turned out 396,757 cars.

Up to Sept., Oldsmobile had assembled 319,966 vehicles to bring the total produced in its 57-year history to 4.5 million units. The division notes that the last half million units

were produced in approximately 16 months.

Oldsmobile's installation of automatic transmissions is also continuing at a high tempo. Thus far, Olds has equipped 2,388,659 cars with automatic units, or 53 per cent of its total production of cars.

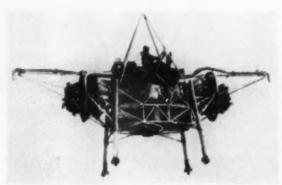
GM Proving Ground Marks 30th Year

In Sept., 1924, the General Motors Proving Ground near Milford, Mich., started operation with 12 employees. Last month the corporation had a staff of approximately 900, testing cars, truck and parts.

The GM Proving Ground began operations 30 years ago with one building and seven miles of test roads on a 1125-acre site. Today it has 25 buildings and more than 42 miles of test roads winding through close to 4000 acres of land.

A total of 9573 cars, trucks and buses have been driven more than 151 million miles on the site, and 40,000 test miles are now being driven there daily. When present construction at the site is completed, GM will have more than 50 miles of test roads and 59,900 sq ft of floor space at that area, it is estimated.

Thews of the AUTOMOTIVE



BRITISH JET

This weird aerial machine, nicknamed the "Flying Bedstead," is a vertical-rising British experimental craft. Shown during a recent test, jet exhausts lift it straight into the air. The craft is said to be England's answer to U. S. vertical-rising planes.

United Press

Mechanics Society Votes to Join CIO

For 21 years since it was organized the Mechanics Education Society of America has always handled its own union problems. Last month, however, it decided to go under the wing of the CIO.

The 52,000-member organization voted in New York to join Walter Reuther's union to stop competing for industrial shops. Under present plans, the MESA will be guaranteed full autonomy by the CIO. It will be given a charter as soon as a few minor problems concerning areas of jurisdiction are ironed out.

MESA's stronghold is Cleveland, O., where it has more than 22,000 members. When first formed, the organization represented only tool and die workers, but it later changed to an industrial union.

General Motors Expanding Assembly Plants in Europe

Announcement by General Motors Corp. that it will spend \$6 million to double assembly capacity at its Antwerp, Belgium, car and truck plant further bolsters the company's optimism in the European market. Since last June, GM has laid out more than \$177 million for expansion of facilities in Europe. GM's expenditures abroad are exclusive of the \$1 billion expansion program underway in the U. S.

Just several days prior to the announcement of the new Belgium program, GM president Harlow H. Curtice, touring the company's European installations, revealed that the corporation expects to boost its export volume of Vauxhall automobiles.

GM will spend approximately \$101 million for expanding its plants in Luton and Dunstable, England, over the next five years. A \$71.425 million expansion has been underway at Opel in Germany since last June.

Confident in the future, Curtice estimates that, by 1960, Belgium, Luxembourg, and The Netherlands will provide a market for 166,000 motor vehicles. This figure is about 26,000 more units than are expected to be sold in those three nations this year.

GM itself has its sights set on sale of about 55,000 vehicles, which would constitute about one-third of the market in those nations. Both Vauxhall and Opel, GM subsidiaries, will produce 40 per cent more cars and trucks in 1954 than in their best prewar year. GM estimates.

GM's Continental Antwerp unit, one of the company's first overseas assembly plants, is geared to sell about 42,000 cars and trucks in the three nations this year. Since World War II, GM has approved expenditures of almost \$20 million on that plant, including the recently announced \$6 million program.

In Sweden, one of Curtice's stopover points during the trip, and Finland the "new productive vitality" is absorbing cars and trucks at the rate of 142,000 a year. This is better than three times the prewar rate.

Sweden itself, GM notes, is buying cars and trucks at an annual rate of 128,000. By 1960, vehicle volume

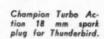
at Nordiska, which assembles GM's American cars and trucks as well as Vauxhall and Opel vehicles, will be 73 per cent greater than that for 1954, the GM president predicts.

New Champion Spark Plug Ready For Use on Ford Thunderbird

Champion Spark Plug Co. has announced development of a new 18 mm Turbo Action spark plug which is to be used as original equipment on the Ford Thunderbird. According to reports, the plug will also be used as standard equipment on 1955 Ford, Mercury, and Lincoln passenger cars, and Ford trucks.

The new unit is reportedly designed to provide maximum performance at all speed ranges in high-compression automotive engines while avoiding excessive fouling under city driving conditions. It makes use of increased clearance volume between the insulator and the bore of the shell at the firing end of the plug to give a wider heat range.

The new plug also has a tapered seating surface which matches a mating surface in the cylinder head of the new Thunderbird engine and is installed without a gasket. The Turbo Action plug will not replace 18 mm plugs in existing engines because of the tapered seat. There is a possibility that a tool may be developed for chamfering the cylinder head to accommodate the seat, but there is nothing definite on this yet.





AND AVIATION INDUSTRIES



CARE MAKES QUALITY

Illustrated here is one step in the alloy steel quality control plan in effect at Joseph T. Ryerson & Son, Inc. Every order is carefully examined before shipment, and all of the requirements are reviewed. Inspection covers: type of alloy: size; length; finish; quantity; condition; weight; color marking; heat identification; packing; and shipping. Inspection tag gives assurance that all specifications have been met.

Ford Boosts Benefits Under Pension Plan

Ford Motor Co. has revised its pension system for the second time since last June. Under a new plan, subject to approval by the Treasury Dept., more than 1000 retired Ford workers will realize increases ranging from \$5 to \$13.50.

The retirement plan covers both UAW-CIO and salaried employes and raises the benefits of all present retired workers by the full amount under the new social security increases. Under the new plan, most of the retired Ford workers receiving monthly pensions of \$125, including social security, will not have the company-paid portion of the pension cut back to offset the social security increase.

Thus, they are able to receive the full benefit of the social security boost. Last June, the company revised its general retirement plan to give salaried employes about a 33 per cent increase in benefits without extra cost.

TABLOID

Bell Aircraft Corp. is now testflying its "Magic Carpet" Convertijet plane. . . . Fairchild Aircraft is currently flight-testing an experimental turbojet power augmentation installation on a C-82 Packet plane.

First nuclear reactor for industrial research will be established at Armour Research Foundation of Illinois Institute of Technology.

Pressed Steel Car Co., Inc., has completed negotiations to acquire Clearing Machine Corp. for between \$9 and \$10 million. . . . Minneapolis-Honeywell Regulator Co. has acquired the assets of Heiland Research Corp.

Toledo Porcelain Enamel Products Co. is now coating automobile exhaust systems with ceramics. Process is claimed to increase life of such parts by three to five times.

Minnesota Mining & Manufacturing Co. has been named one of the five best managed companies in North America by the American Institute of Management.

Zagar Tool, Inc., has established a new branch office at 610 West Michigan Ave., Milwaukee, Wis. . . . Wagner Brothers, Inc., has consolidated all equipment manufacturing facilities in a new plant at 7800 Dix Rd., Detroit, Mich.

AP Parts Corp. has purchased Belond Manufacturing Corp., Southern California Muffler Corp., Asco Bending & Manufacturing Corp., and Mello-Tone Mufflers, Inc. . . G. L. Ohrstrom Associates have acquired the assets of Hammond Manufacturing Corp.

Link Aviation, Inc., has begun manufacture and distribution of a new line of scientific instruments for use by other industries. Included are testing and recording devices and mechanical and electronic components.

Mullins Manufacturing Corp. is purchasing all the Class A stock of Schaible Co.... Olin Mathieson Chemical Corp. has acquired a substantial interest in Hunter Engineering Co.

Univ. of California is offering its first Engineering and Management course Jan. 31 to Feb. 11, 1955.

Gramm Trailer Corp. is reported to be negotiating the sale of its plant in Wapakoneta, O., and plans to move its general offices from Lima to Delphos. National Automotive Fibres has, meanwhile, leased the old Gramm plant in Forest, O.

Robertshaw-Fulton Controls Co. has opened a \$1 million research center at Irwin, Pa., to develop control devices for home appliances and industry.

. .

H & H Tube Manufacturing Co. has expanded its services to include the cold fabrication of welded and seamless steel and aluminum tubing.

Panellit, Inc., and Taller & Cooper, Inc., have announced an affiliation in the process data-reduction field.

Curtiss-Wright Corp. has been awarded a contract to design and build a simulator for the Lockheed C-130 turboprop transport.

(Turn to page 202, please)

Mews of the AUTOMOTIVE

Studebaker May Produce Packard Cars in Canada

There appears to be a possibility that Packard automobiles may be manufactured in Hamilton, Ont., by Studebaker Corp. of Canada. Packard has not manufactured automobiles in Canada since the war, although it has maintained an office, warehouse, show rooms and a parts depot at Windsor.

Boericke, Al Metals Expert, Is Author of New Booklet

Fresh off the press is a 36-page booklet entitled *Price Fixing*, Controls, and Allocation of Non-Ferrous Metals by W. F. Boericke. The author is metals consultant and contributor to AUTOMOTIVE INDUSTRIES and consultant to Hayden Stone & Co.

Mr. Boericke analyzes what happened when price fixing, controls, and allocations were adopted for a basic U. S. industry—the production and processing of non-ferrous metals. The study is devoted to the problems of

the copper, lead, zinc, aluminum, and tin industries, with major attention given to the first three named. Copies of the booklet are available at a nominal price of \$1.00 apiece from the publisher: American Enterprise Association, Inc., 1012 14th St., N. W., Washington 5, D. C.

Chevrolet Buffalo Area Plants To Be Huge Materials Users

Chevrolet, which has thus far spent close to \$30 million to put up new plants in Tonawanda, N. Y., is expected to become a 10,000-ton-a-month consumer of steel produced in the Buffalo area.

Furthermore, expenditures of \$1.7 million or more a month for basic raw materials when its new forge and foundry plants are in full-scale operation are anticipated.

In addition to the 10,000 tons of steel that will be consumed monthly in the new forge plant, 7000 tons of pig iron and 14,000 tons of sand reportedly will be required every month for the new foundry.

Ford Foundation Earns \$46 Million on Stock

The Ford Foundation, which is considering offering stock for sale to the public, spent more on charity last year than it earned on shares it holds in the Ford Motor Co. During 1953, grants and expenses exceeded \$60 million, against an income of \$46.361 million.

Biggest grants, totaling \$20 million, were made to support education in the U. S. As of Dec. 31, 1953, the Foundation had liabilities and assets amounting to \$520.232 million, which included \$417.137 million in non-voting Class A stock in Ford Motor Co.

The 1953 income was on the 3,089,-908 shares the Foundation holds in the automobile company. The Foundation, which is presently studying a plan for sale of the stock, started publishing its figures on Ford stock only three years ago.

Its 1953 income is based on a dividend of \$15 a share, compared with a \$10 dividend in the two preceding years. Based on the increased production of automobiles which is expected to increase Ford profits, the dividend may go higher this year.

The proposed sale of Ford Motor Co. stock is designed to provide wide ownership and stimulate demand for Ford products by stockholders. Consequently, the stock might well be split 10 to 1 before the offering to make it available to small investors.

OUTPUT FOR NINE MONTHS OFF 16% FROM 1953 1954 Passenger Car Production

As reported to Automotive Industries by the car factories

	September	August	September	Nine	Months
	1954	1954	1953	1954	1953
Chrysler	None	4.391	4.354	86.777	125,456
De Soto	None	3.693	5.635	45.883	100,412
Dodge	113	10.805	16.313	85,868	233.990
Plymouth	1,861	11,671	40,268	262,431	497,529
Total—Chrysler Group	1,974	30,460	66,570	460,960	957,387
Ford.	114,143	120,374	120,120	1,100,119	879,380
Lincoln	2,345	2,979	287	29,695	35,156
Mercury	21,848	17.588	36,432	211,104	232,986
Total Ford Group	138,336	140,941	162,839	1,340,918	1,147,522
Bulck	41,615	44,278	40,846	416,053	412,035
Cadillac	10.674	11,048	3.984	94,114	82,647
Chevrolet	37,690	133,156	128.787	1,053,737	1,179,074
Oldemobile	34.907	36,101	12,289	333.133	270,079
Pontiac	4,238	29,090	26,427	253,955	330,934
Total - G. M. Group	129,124	253,671	212,333	2,150,992	2,274,769
Hudson	3.517	3.858	5.944	24.537	63,432
Mash	5,940	3,144	4,717	51.397	112,164
Total-American Motors	9,457	7,002	10,661	75,934	175,596
Henry J.	4101144		78		6,150
Kalaer	None	None	167	5,409	19,248
Willyn	380	180	3,286	9,357	40,482
Total Kalser Motors	380	190	3,531	14,766	65,800
Packard	1,322	2.628	3.228	25,250	74,781
Studebaker	300	1,759	13,636	21,740	156,255
Tetal-S-P Corp.	1,622	4,387	16,864	46,990	231,036
Total—All Makes	280,893	438,641	472,788	4,090,560	4,852,190

FTC To Air Charges Against Truck Maker

A hearing on charges that Yale & Towne Mfg. Co. is violating FTC price laws is scheduled for Nov. 9 in Philadelphia. FTC charges that the company, one of the largest producers of industrial trucks, is underselling its competitors by offering discounts up to five per cent to its larger customers.

The company contends that such discounts have totaled only slightly more than \$155,000 on sales of over \$3 million. Furthermore, it states that less than five per cent of its largest customers, who purchase over \$5000 of equipment, have received the discount benefit.

AND AVIATION INDUSTRIES

GM, Ford Take Action On Lawsuit By Dealers

Latest information on the lawsuit filed by two used car dealers in Waterbury, Conn., against the Big Three car makers indicates that only two of the manufacturers will fight the litigation. Ford plans to take no counter-action on the suit and the National Automobile Dealers Association, also named as a defendant, has not indicated whether it would do so.

General Motors has filed a request with the Federal Court in New Haven, Conn., to dismiss the antitrust suit, and Chrysler has asked for a pre-trial hearing to examine the case more closely.

GM asserts that the dealers' suit fails to cite a specific claim on which the companies can grant relief.

The Waterbury dealers, Erwin Hathaway and James Walsh, charge the "defendant manufacturers" with monopolizing the manufacture, distribution, and sales of automobiles." Since they claim that they were unable to get a franchise or cars from the manufacturer, the two reportedly were forced into the business of selling cars through "bootleg" channels.

Their suit asks for triple damages totaling \$1.232 million. In addition to the Big Three and NADA, it also names nine local franchised car dealers.

AC Device Speeds Tests Of Electronic Weapon

A new device that is said to reduce the testing time of the Skysweeper, an electronic artillery gun, from 40 hours to one hour has been developed by AC Spark Plug. Called the "hipot," the apparatus, which resembles a pin-ball machine, can automatically test hundreds of electrical connections in the Skysweeper for shorts and breaks.

Twelve plug-tipped wires, each with 75 contacts, are connected from the device to contacts on the Skysweeper wiring harness. A mass of lights on the "hipot," numbered to correspond with wires on the harness, automatically stop flashing when a faulty connection is found.

AUGUST SALES OF 521,450 UNITS MARK YEAR'S LOW 1954 U. S. Motor Vehicle Factory Sales*

				Totals	
January February Warch April May Jane Jane Jaly	Passenger Cara 454, 562 446, 678 531, 529 534, 667 497, 062 507, 065 451, 663	Trucks 96, 167 87, 141 101, 177 96, 723 91, 226 91, 470 78, 807	Buses 405 328 207 379 274 351 248	1954 551, 134 534, 145 633, 003 631, 769 568, 562 566, 876 530, 416	1953 584,470 582,200 700,439 722,675 642,132 660,131 702,898
August	445,306	75,835	300	521,450	614,656
Total 8 Months	868.820	718.246	2.588	4,589,355	5,189,601

1954 U. S. Motor Truck Factory Sales By GVW*

	5,000 fb. and less	5,001- 10,000	10,001-	16,000	18,001-	19,501- 26,000	Over 26,006	Total	
January February	45,560 39,373	17,492 16,210	3,606	17,735 15,656	3,658	4,786 5,449	3,348	96,167 87,141	
March.	45,586	18,841	3,719	19,446	4,356	5,322	3,903	101,177	
April	41,950	18,023 16,895	3,765	18,996 16,958	4,017 3,812	4,612	3,670	91,226	
July	37,470	15,936 13,558	3,464 3,280	18,021 15,714	4,284 3,103	3,726 2,430	3,253 2,943	91,470 78,807	
August	35,395	12,744	2,735	15,292	3,986	2,381	3,302	75,635	
Total -8 Mos. 1954	331,309	129,699	27,106	137,818	31,133	33,760	27,421	718,246	
Total -8 Mos. 1953	390, 112	155,822	33,639	128,453	38,485	86,062	33,255	843,638	

*-Automobile Manufacturers Association

Clark Equipment Acquires Some Business of Torcon

Clark Equipment Co. has announced the acquisition of inventories, engineering designs, and products, tooling, trademarks and patents and certain other assets of The Torcon Corp., Ashtabula, Ohio. The latter is a producer of torque converters.

In taking over inventories and business-in-hand of Torcon, Clark is not purchasing Torcon's capital stock, nor is it assuming Torcon's liabilities. Clark also is not acquiring Torcon's plant facilities at Ashtabula, nor its basic machine tools.

Production operations for the manufacture of the torque converters will be transferred to Clark's transmission plant at Jackson, Mich. Financial considerations involved in the transaction were not disclosed.

Kaiser Seeks Better Price For Dowagiac, Mich., Plant

Virtually all of the machinery and equipment at the Dowagiac, Mich, plant of Kaiser Motors Corp. was auctioned off last month, but a top bid of \$265,000 for 16 buildings and 27 acres of property was turned down by the company. Kaiser hopes to get

a better price for the plant, one of its "surplus" units, by selling it directly.

While the purchase price of the machinery and equipment was not revealed, the Dowagiac auction advertised these at \$750,000, which included tool crib and maintenance supplies, machine tools, trucks, fork lifts, conveyors and other handling equipment. Original value of the buildings and equipment was estimated at \$2 million by the company.

New Car, Truck Headlamps Run Into Temporary Snag

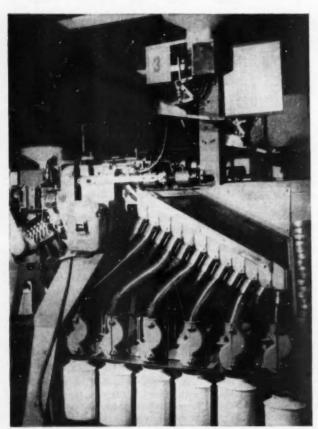
A peculiar situation has developed with regard to the new type of head-lamp for cars and trucks scheduled to be adopted by all manufacturers as standard equipment on new vehicles some time next year. Adoption has been held up until all, or most, state legislatures approve changes in laws. However, the lamps may be on the market as replacement units in early 1955 in states where legislatures meeting this year already have approved the change.

Continued on Page 108



THE NUMBER 15245 on the bearing cup together with 15123 on the cone means it's a tapered roller bearing of a certain size commonly used in front wheels. But, when it's next to the trade-mark "Timken*" it has another important meaning: it tells of the bearing's fine quality and the services that go with it.

The number with a double meaning



WE MATCH ROLLERS IN EACH BEARING to almost microscopic limits. Grinding and honing rollers to extremely close tolerances isn't enough. This machine sorts them into even more precise sub-sizes. Result: all the rollers in each bearing are the same size, each roller earries the same load. This assures quieter operation, longer life. It's just one more step we take to make sure Timken* bearings are the most accurate parts for your car's vital zone—the moving parts.



TO GUARANTEE THE HIGH QUALITY of the steel used in Timken bearings, we make our own. We're the only bearing manufacturer in the U. S. A. that does. And, though it's the finest bearing steel ever developed, we're always looking for ways to improve it. For instance, we use this X-ray diffraction unit to study the residual stresses present in heat-treated steel parts.



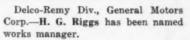
OUR ENGINEERS WORK TO SOLVE YOUR PROBLEMS. We get valuable data from this rear axle oscillating test, which runs bearings under abnormal load conditions. For value, always specify "Timken" along with the bearing number. And for full value, always use a Timken bearing cup with a Timken bearing cone. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable: "Timrosco".

TIMKEN is number 1 for VALUE where value counts most...in the vital zone not just a ball O not just a boiler the timken tapered boiler bearing takes radial of and thrust-O-loads or any combination-O-

Men in the News



Chrysler Corp., Defense Operations Div. —John J. Grant is now manager of industrial relations.



Monroe Auto Equipment Co.— Charles S. McIntyre has been elected an executive vice-president.

Westinghouse Electric Corp.—H. C. McDaniel has been appointed manager of technical information.

Parker Rust Proof Co.—Dr. R. C. Gibson has been promoted to assistant vice-president; E W. Richards, technical director; and R. I. Peterson, service manager.

Spencer Mfg. Co.—Leon W. Fisk has been appointed sales manager.

Carboloy Dept., General Electric Co.—Robert L. Bell has been named manager of manufacturing engineering.

Ohio Crankshaft Co., Tocco Div.— A. O. Wood is now Chicago district manager.

Chrysler Corp., Export Div.—James R. Tankersley, Jr., was made regional sales representative in the Caribbean area.

Hudson Motors Div., American Motors Sales Corp.—Lew Sumpter was appointed Western divisional sales manager.

Allison Div., General Motors Corp.

—Oscar A. Lundin was named divisional comptroller.

Gardner-Denver Co.—B. P. Spann has been elected a vice-president.



Euclid Div., General Motors Corp. — J. W. Bloomquist has been appointed domestic sales manager.





Ford Motor Co.—Charles Columbus has been appointed industrial relations manager for the Manufacturing Services Div., succeeding E. Mead Baker, Jr., who has been named industrial relations manager of the Metal Stamping Div.

P. R. Mallory & Co., Inc.—Douglas M. Considine has assumed the responsibilities of sales promotion and merchandising manager.

Borg - Warner Corp., Atkins Saw Div. — Carl J. Meister is now vicepresident for sales.

General Metals Corp., Adel Div.— John W. Kelly was appointed vicepresident in charge of engineering.

Gas Machinery Co., Industrial Furnace Div.—Charles H. Schwerin has become manager.

Westinghouse Electric Corp.—A. C. Meixner has been chosen assistant sales manager of apparatus products.

Chrysler Corp., Marine & Industrial Engine Div. — Frank L. Harris has been selected to head the new Los Angeles area office.

Pittsburgh Plate Glass Co.—Michael J. Batenburg is now director of information; Richard W. Dittmer, manager of public relations; and Norman L. Park, manager of publications.

Hy-Pro Tool Co.—John M. Horvath has been appointed a direct factory representative in the metropolitan New York City and northern New Jersey area.

(Turn to page 190, please)



Hydraulic Press
Mfg. Co., Machinery
Div.—R. W. Powell
is now general sales
manager.

Aero - Coupling Corp. — Charles W. Sawhill was appointed general sales manager.



Necrology

Milton O. Cross, 79, founder of the Cross Co., died Sept. 25, at Detroit, Mich.

William W. Trench, 62, retired secretary of General Electric Co., died Sept. 22, at Schenectady, N. V.

Fred W. Cederleaf, 64, retired manager of the Warsaw, Wis., plant of Borg-Warner Corp., died Sept. 24, at Detroit, Mich.

Arthur R. Schumann, 48, manager of sales for Standard Tube Co., died Sept. 18, at Detroit, Mich.

George P. Miller, 63, supervisor of Government parts contracts for Chrysler Corp., died Sept. 25, at Detroit, Mich.

Thomas R. Navin, 64, president, general manager, and a founder of Detroit Bevel Gear Co., died Sept. 30, at Detroit, Mich.

Harry D. Dodge, 65, former manager of Chrysler Corp. overseas operations in London, died Sept. 27, at Minneapolis, Minn.

Charles S. Doran, 80, former president of Sperry Gyroscope. Corp., died Sept. 28, at Oceanside, L. I., N. Y.

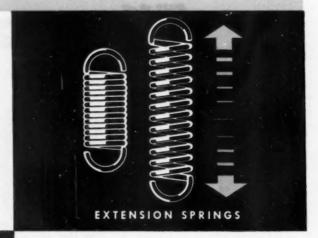
Daniel C. Eipper, 62, chief design engineer of Moline Tool Co., died Sept. 21, at Moline, Ill.

Paul Mackal!, 68, retired vicepresident in charge of sales for Bethlehem Steel Co., died Sept. 16, at Bethlehem, Pa.





COMPRESSION SPRINGS







FLAT SPRINGS

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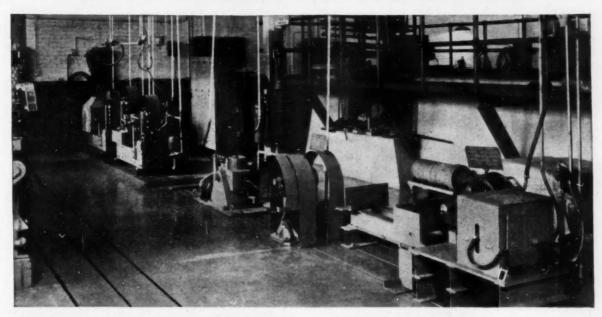
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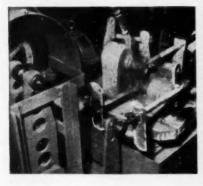
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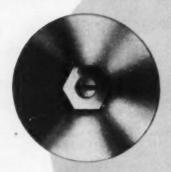
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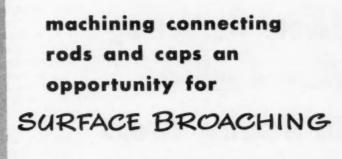
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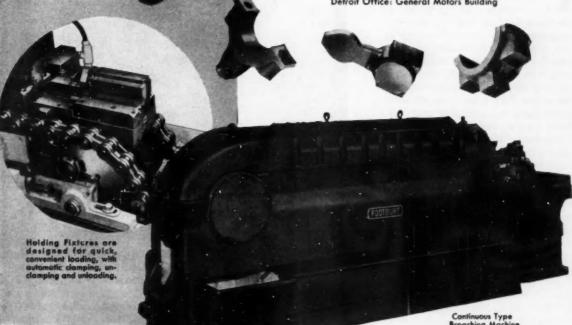


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FOOTBURT

Flame Hardening Now Applied to Bearing Areas of Crankshafts

machining, flame hardening provides a case of 0.125 in. minimum depth and 55-60 RC surface hardness after being tempered for four hours at 450 F.

In producing the case, care is exercised to insure that it does not extend into the fillets at the ends of bearings. Actually, the hardness pattern is so controlled that the case extends from the center of each crank pin to points ½ in. from those at which fillets start. This provides the hardness where it is needed but avoids softening the fillets, which might result in fatigue failures.

This is accomplished by controlling the flow of gas in flame heating so that the temperature is highest at the center and is reduced from this point outward so that the critical temperature never extends closer than $\frac{1}{8}$ in. from the start of fillets. As in other similar flame heating, the pattern of holes

By Herbert Chase

HRYSLER Corp. recently has introduced new methods for increasing the hardness of crankshaft main bearing journals and crank pins of truck engines in the company's lines and is using closely controlled flame heating followed by quenching to accomplish the desired results. This is believed to be the first application of automatic flame hardening to multi-cylinder engine crankshafts.

Cincinnati Flamatic machines designed and built especially for the purpose are now in use in production setups at the Highland Park and Dodge main plants. Though not yet applied on a high production scale, the operation is proving successful. It has been added with production advantages to an induction

hardening operation that does similar work. Flame hardening in these setups is employed at present on six-cylinder engine crankshafts and on V-8 engine crankshafts for Dodge trucks and Chrysler industrial engines. When a case of greater hardness is produced on the journals, it is possible to employ harder bearing inserts and thereby to lengthen bearing life. Shafts for initial induction and flame processing were made of SAE 1052 steel. More recently SAE 1046 steel has been substituted as part of a production standardization program.

All crankshafts to be flame hardened are first furnace hardened all over to 228-269 Bhn. After this treatment and the subsequent rough

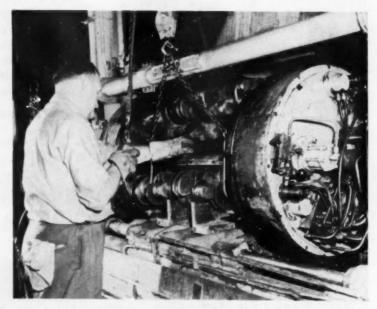


FiG. 1—Loading a crankshaft for a six-cylinder truck engine in a drum fixture in which, after indexing to a position on the opposite side, flame heating for case hardening is done while the shaft is rotated.

that admits gas to the heating area is so established that the required temperature gradients are maintained.

Heating is done by supplying carefully controlled proportions and amounts of oxygen and propane at ratios of about 4 to 1 and combining these in combustion so that the respective areas attain the required temperatures within the heating period set. This time is controlled automatically by the machine. For the six-cylinder engine shafts, all bearing surfaces are heated at once and then are quenched immediately. In the setup for V-8 engines, all main bearing journals are first heated and quenched and then the operation is repeated on each of four crank pins in succession.

Before case hardening is done, a wooden plug which has been soaked in a calcium chloride solution to resist charring, is driven into the oil hole in each pin and journal. These plugs keep the edge of the hole from overheating and thereby avoid the formation of radial cracks in the case around the holes. Plugs do become partly charred but still serve the purpose intended.

Figure 1 shows one of the six-cylinder engine shafts being loaded between centers in the horizontal air clamping indexing fixture used to position the shaft during the heating process. Before indexing into the heating station, each shaft stops at an intermediate (top) station. When the shaft reaches the heating station, Fig. 2, the drumlike fixture is advanced horizontally so that burner blocks, each having its own orifice

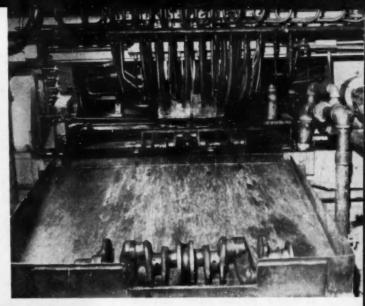


FIG. 3—Rear view of the Flamatic machine showing, in the foreground, a shaft that has been quenched after flame hearing of all bearings and, at center, another shaft emerging from the quench on a woven wire belt.

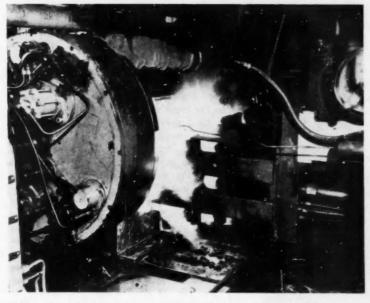


FIG. 2—Flame hardening in process on all bearing surfaces of the crankshaft in the same fixture shown in Fig. 1. Burner blocks for crankpins are reciprocated as the shaft is rotated.

which elevates the shaft into a chute, as in Fig. 3. Although the machine includes electronic indicators that show the temperature attained on surfaces heated, these indicators are used for checking only, since the close control on the composition of the gas and its flow to each bearing is maintained automatically and, in the time set, assures the temperature and heat penetration necessary to give the case specified.

Case depth is not uniform but

pattern, come close to the particular bearings to be heated.

Thereupon, the preset mixture of oxygen and propane is

Thereupon, the preset mixture of oxygen and propane is fed through each orifice under fixed pressure and the flames created heat the bearings for 33 sec as the shaft rotates about its own axis. During this period, the burners heating the main bearing journals remain fixed but those heating crankpin surfaces have to oscillate in such a way as to retain their respective positions relative to the crankpin surfaces. Burner blocks do not rise on the bearing surfaces heated but remain a fixed distance from the bearings, leaving space for the flames to play on the surfaces as heating proceeds.

At the end of the heating period, gas flow is shut off and rocker arms grip the shaft at its ends and lower it into the water quench while shaft rotation continues for a short period. Then the shaft is released onto a wire mesh belt

FIG. 4—Using a Scieroscope to check the hardness at several points on each bearing surface of a crankshaft for a six-cylinder truck engine to make sure that the specified hardness pattern is maintained.



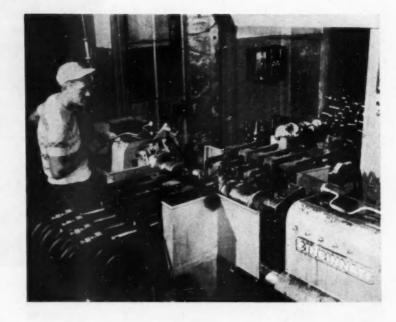
varies from a maximum at the center of each bearing to zero at end points \(\frac{1}{2} \) in. from fillets. Hardness attained is 55 to 60 Rc over a central band on each bearing surface but falls to 30 Rc near the outer ends of the hardened case. Close to the fillets, hardness is 228-269 BHN, which is the base hardness attained in prior furnace heat-treatment.

After flame hardening, every shaft is checked at each bearing by use of a Scleroscope, as shown in Fig. 4, to make sure that the specified hardness pattern is maintained. Total average time per cycle of the flame hardening machine above described is about 80 sec.

Corresponding flame hardening on crankshafts for eight-cylinder truck engines is done also on a Cincinnati Flamatic machine, Fig. 5, installed at the Dodge Main plant. Al-

though the flame hardening results are the same as already described, design of the machine and fixture are varied to suit the different shafts.

In this machine, the shaft is set and rotated be-



tween centers, and remains in one position throughout the heat-treatment of main bearing journals. Burner blocks for these surfaces (foreground in Fig. 5) remain in fixed position during heating and are

used simultaneously with the shaft rotating. At the end of a 45-sec heating period, gas is shut off, burners retract and the bearings are spray quenched with water.

Burners for the crankpin are not made to reciprocate and are used one at a time after the machine centers are reset in their holders so that the shaft will rotate about the center of the crankpin to be treated. When thus reset, a burner is advanced and heats the corresponding pin for 29 sec. Then the burner is withdrawn and quenching is done. The same operation is repeated in succession on the three other pins, using, in each case, the corresponding burner.

With this setup, it is necessary to set the shaft in five different positions successively, with heating in each. It is possible, however, to use this machine for different V-8 engine shafts whereas the machine in Fig. 1 is a single-purpose

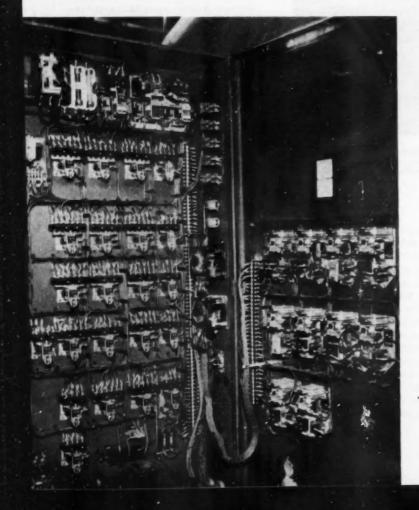


FIG. 8—Panels containing the electrical controls, including relays and timers, that govern the proper gas-oxygen mixture and the flow of gas in the flame hardening of crankshafts for eight-cylinder truck engines. This is an excellent example of the large number of electrical control devices on just one piece of modern plant equipment.

AUTOMOTIVE INDUSTRIES, October 15, 1954

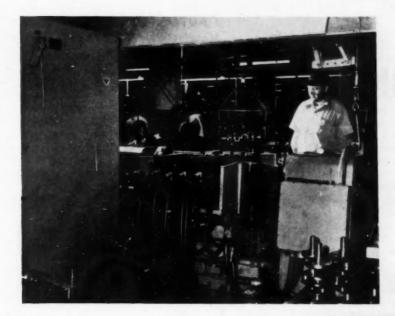


FIG. 5—lilustration at far left shows setup for flame hardening bearings of a crankshaft for an eight-cylinder truck engine in a Dodge piant. Four burner blocks at left center are in position to heat the four main bearing journals at one time, as the shaft is rotated.

FIG. 6—Rear view of the same Cincinnati flame hardening machine shown in Fig. 5. Hose lines convey a mixture of natural gas and oxygen to the burners, none of which is reciprocated in this setup.

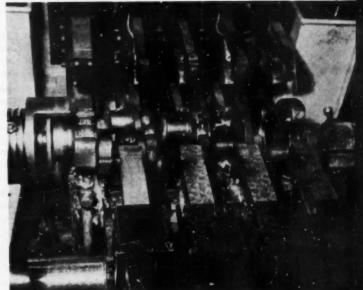
FIG. 7—Below is crankshaft as it appears after the main bearing journals have been flame heated and are being spray quenched.

machine. Following the flame hardening and inspection similar to that for the six-cylinder engine shafts, the crankshalts go to a vertical furnace where tempering is done.

For the machine in Figs. 5 and 6, the fuel is natural gas mixed with oxygen before combustion. Heating is done just as well as with propane, as used in the sixcylinder crank machine, but, of course, the fuel-to-oxygen ratio has to be adjusted to suit the fuel used. Burner orifices for the V-8 setup are slots rather than circular holes (three burners per bearing) whose dimensions are calculated to yield the heating pattern required at each pin. Fig. 6 shows the rear of the machine from the side opposite to that in Fig. 5. Fig. 7 shows spray quenching of main bearings.

At the left in Fig. 6 is a box that houses the elaborate control panels (including timers) for the machine and, above the machine, part of the exhaust hood for combustion products appear.

Whether or not the flame hardening of crankshafts for truck engines will be extended to shafts of passenger car engines, it has been established that such



hardening yields a highly desirable hardness pattern. Results attained were made possible by flame hardening and have not been realized to date by other means

Strick Co., truck-trailer manufacturer in Philadelphia, Pa., has been commissioned by Carnation Milk Co. to make an all-plastic milk truck body. Work on the body is now in progress, and the pilot model is being fabricated by hand lay-up. This

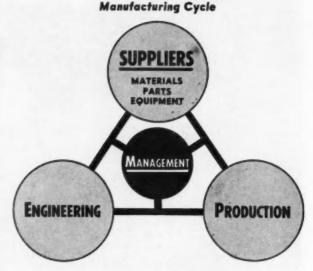
Strick Co. to Turn Out Plastic Milk Truck Body

particular body will consist of just two symmetrical parts bolted together through a neoprene gasket. These halves will contain fiber glass insulation, as will the floor and the two bulkheads.

The body has a curved windshield, two side doors, and a rear door. Height from ground to roof peak will be eight ft, four in.; width six ft, 6 in. Overall length 17 ft, 10 in.

COORDINATION —

Key to
Successful
Volume
Manufacturing



AUTOMOTIVE

By Joseph Geschelin

HAT is the mechanism that makes mass production work in the face of economic flux, advances in management techniques, and the enormous impact of new technology—automation, advanced types of machine tools, and new materials?

The complex of relationships among management, engineering, and manufacturing functions of one of the largest single units in the automotive field was described at the SAE National Production Meeting in March, 1954, by E. H. Kelley, general manufacturing manager, and E. N. Cole, chief engineer, Chevrolet Motor Div., General Motors Corp. In essence, the summaries presented by them show that manufacturing and engineering must work together as a team not only to ensure progress but also to maintain the competitive position of the company as well as its economic health.

Coordination of management, engineering, and manufacturing departments at Ford Motor Co. were described in a two-part article which appeared in Al August 15 and September 1.

CHEVROLET'S

It is quite probable that only a few companies in this industry require the extensive program outlined for Chevrolet. Smaller organizations can work out their problems with less formality and with relatively fewer

people involved. Nevertheless, the same philosophy and the same slant are imperative. The impact of new machinery and new processes as well as the role of automation demands close coordination of engineering with production. The role of new materials and metallurgical advances exerts a controlling effect upon design and production methods as well.

Management, on the other hand, establishes the overall policies—defines strategy, determines budgets, assesses competition, establishes desirable advances in the general progress of design. Hence management has the major stake in the coordination of activities, and participates in policy areas of this complex of committee activities.

GMC . . . Truck and Coach Setup

At this point let us examine the procedure in a sampling of a few well known plants. GMC Truck & Coach Div. is one of the largest of producers of commercial vehicles, heavy duty trucks, and buses. Its production problems are complicated by the combination of high volume output of many models and relatively low volume for special vehicles. An enormous variety of models and options serves to further complicate scheduling and manufacture. Lead time as well as economic limits on the cost of tooling vary widely. The problem is far removed from that of a large passenger car producer.

At GMC the personal contacts between production and engineering on a new model or change in detail design start at the inception of design. Initial consultation take place over the layouts or with proposed design details. Detail drawings often relate to parts

of similar design on which tools already exist. New part drawings may then be released in advance for tool study and suggestions by manufacturing. Meanwhile, the design of associated parts is continued. If these changes affect parts already released for advance study, suitable changes or modifications still can be effected without confusion or cost penalty.

This flexibility of cooperative action in the early stages of design saves GMC both time and money in

the final result.

CHRYSLER **Emphasizes Costs**

CCORDING to a paper presented by F. G. Force, A supervisor of central estimating, Chrysler Corp., at the Annual Technical Convention of The American Society of Body Engineers last year, the catalyst for coordinating engineering with manufacturing, purchasing, and other related functions of Chrysler Divisions is COST. And the central agency responsible for coordination is the Central Estimating Department.

This department has the responsibility for processing all engineering releases, engineering changes, and special orders. It prepares tool project estimates and the general production costs of all commodities manufactured by the corporation. It also produces estimates for all forward products and design changes.

How Central Estimating performs these functions can be explained briefly by some specific examples. For one thing, it establishes the source of the part to determine whether it will be purchased or made within the corporation. If the part is to be made, estimating determines which plants and departments will make it.

Central Estimating also establishes the manufacturing costs on all special orders such as special paint jobs, fleet sales, special models for taxicab use, etc.

The department also sets up all tool and equipment project estimates. It is the rule at Chrysler that before any division can tool up for a new program, the project must be developed completely and referred to the Accounting Division. Central Estimating then receives drawings and specifications and makes a complete cost analysis on all parts. The tool costs are assembled for the entire project and forwarded to the management for approval.

One of the major activities of the department is that of advance estimating incident to new programs. It secures for engineering, purchasing, and production divisions cost estimates that serve as a guide in establishing sources, and in manufacturing methods. Advance estimating is done in two stages-design cost and production cost. Engineering is concerned primarily with design cost. Consequently, advance designs are evaluated as to product cost and tool and equipment costs and these are presented to engineering as a guide to the most economical and practical design.

Since the manufacturing divisions are primarily interested in production costs, the various designs proposed by engineering are submitted to manufacturing after they have been evaluated by the estimating department.

Production cost studies also are made for the Purchasing Division, based upon available equipment in vendor plants. This enables purchasing to establish prices on parts supplied by outside sources. Central estimating also analyzes current purchased parts to determine whether they might be produced more advantageously by Chrysler.

Although changes in product design normally originate with engineering, the process also works in reverse. For example, a foreman or superintendent may request a change to reduce cost or improve safety. Tool Engineering initiates changes to simplify producsion methods, or to facilitate use of automation, or to improve working conditions.

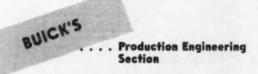
Plant Engineering may issue a parts change to improve heat treating or efficiency in plant maintenance. The Planning Department may initiate an engineering change to improve materials handling or to provide for more efficient storage or to conserve shipping space. Similarly, change requests may originate with purchasing of time study.

In any event, when such change requests are made they are sent to the Central Engineering Division which, in turn, issues copies to all resident engineers and to Central Estimating. Resident engineers have the authority to approve or disapprove the request insofar as it affects their individual operation.

Central Estimating analyzes all change requests, transmitting them to master mechanics, time study, central pattern or foundry and forge divisions for their recommendations. The complete analysis then is referred to the plant manager as well as engineering for final approval or disposition. If the change is approved all around, it is processed by engineering and a new release issued to the central routing division. From this point on the change goes through official channels-purchasing, time study, accounting, to the master mechanic for changes in tooling and authorizations for new equipment, etc.

To function properly and effectively, Central Estimating is departmentalized into divisions manned by specialists in the following major divisions: trucks; chassis; body-in-white; body-paint and trim; marine and industrial engines; engineering changes. Within these divisions are specialists, including the following functions: advance estimators, change estimators, cost

estimating clerks, and general clerks.



THE key to coordination of engineering, manufacturing, and other related functions at Buick is found in the Production Engineering Section which is manned by seasoned production engineers. Generally speaking, this group works closely with engineer-

COORDINATION — Key to Successful Volume Manufacturina

. . Continued



ing and manufacturing departments, and serves to transmit the engineering viewpoint to the factory on the one hand and on the other to explain the factory problem to engineers.

One of the problems frequently encountered in launching a model is to integrate design details so as to meet the requirements of BOP plants as well as the main assembly at Flint. To this end supervisors from the various BOP plants visit engineering several months in advance of new model production. Production engineers work with these groups and aid in recommending the slight changes necessary to facilitate assembly.

Production engineers also serve as arbiters between engineering and manufacturing on dimensional tolerances; aid in improving product design by studying, testing, and sponsoring changes which may be suggested by process or manufacturing or inspection departments. As a matter of overall interest, the section is constantly seeking opportunities for cost reduction by design changes, standardization of fastenings, etc.

The section also maintains personal contact with BOP assembly plants where a good percentage of Buick cars are assembled for the market. One of the principal contacts in this instance is with the Standards departments on mutual problem of assembly labor and tooling to handle effectively three different makes of cars built at seven different locations. In addition, contact is maintained to assure the standard of quality established by Buick.

VEHICLE DEVELOPMENT PROGRAM STYLING EXPERIMENTAL DESIGN EXPERIMENTAL BUILD EXPERIMENTAL TESTS PRODUCTION DESIGN TOOLING PROGRAM DESIGN CHECK MODELS PURCHASE MATERIALS PILOT MODEL DUNCEMENT & MATIONAL CONVENTION START OF PRODUCTION 21 MONTHS

Typical Chevrolet engineering program timing chart for a major program

Among its other activities, production engineering follows service complaints and their correction; follows deviations for change in materials specifications in cases where this has been requested by purchasing. Contact too is maintained with traffic departments to assure that shipments by truck or rail are properly handled without damage to the product.

An excellent example of how production engineering serves to coordinate engineering and manufacturing for the common good is found in the case of the new Dynaflow transmission. When the initial layouts of the transmission were made available by engineering, the factory superintendent, his assistant, and the head of the Dynaflow inspection department together with the production engineer met with the design group. Suggestions were made by the production group as to modifications tha might simplify machining, assembly, etc.

A few pilot transmissions were made from the revised design, one of these being assigned temporarily to the production engineer. It was sent to the factory and disassembled under the direction of the production engineer, general foreman of the assembly line, and chief inspector. The component parts then were divided into groups corresponding to the departments in which they are produced. The general foreman and foremen of each of the affected departments were called in for consultation and combed the components with the chief inspector and production engineer.

Another pilot run of transmissions then was produced by the transmission department and a further study made of problems relating to the foundry, heat treat, gear department, and machining departments. By the time these many individual contacts had been effected, all of the foreseeable problems had been reconciled and the design was then frozen for release to production.

STUDEBAKER **Product Engineering** Department

Tow consider The Studebaker Corp. Here most of the liaison between engineering and production is effected through the Product Engineering Department, headed by the chief product engineer. The group is composed of personnel possessing the training and experience required for proper understanding of the production phases of the end product.

As new model changes or detail design changes are initiated by engineering, it is a function of the product engineer to determine in advance how such changes affect existing production facilities and requirements. In many instances the subsequent investigation may reveal that only a slight modification in design could effect substantial savings in labor or equipment. Such liaison is made regularly with the body plant, trim department, foundry, machine shops, and final assembly lines.

Since many of the components are furnished by outside parts suppliers, the product engineering group maintains contact with the suppliers to assure that adequate inspection procedures are observed, and in the case of design changes to see that early samples are submitted for approval ahead of production requirements.

This procedure works just as well in reverse. For example, if the production department feels that a design change or change in dimensional tolerances in a given part would facilitate manufacture or assembly, a formal request to this end is made through proper channels. This recommendation is investigated by the product engineering group and if the change can be made without adverse effect on related parts or on function or service life, the change is put through with engineering approval.

It is of interest that the service engineering department also operates under the chief product engineer. Primary function of the service group is the investigation of service difficulties, particularly chronic complaints. Investigation may reveal the cause to be inadequate service information, some unusual production problem, or may indicate a design change. In any case, steps are taken to effect the correction.

PACKARD'S

Let's now turn to Packard Motor Car Co. Since the company enjoys the luxury of facilities for the design and manufacture of bodies as well as chassis components, these activities will be treated separately below.

The following is a summary of coordinated action in connection with a new body program:

1. Product Planning, section of forward planning office, after holding conferences with engineering and styling sections, making competitive analyses, reviewing sales objectives and production requirements, presents to the product committee recommended overall specifications for new designs and models.

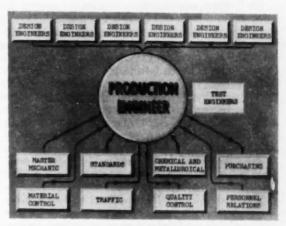
2. Product committee reviews specifications and approves final determinations.

3. Styling, section of engineering department, develops clay mock-ups of proposed models within areas

of specifications submitted, incorporating concepts of styling philosophy in conjunction with product committee.

 Clay mock-ups are reviewed by product committee during periodic progress of completion and "sweetened" to meet the consensus for direction required.

5. Toward final completion of clay mock-ups, manufacturing engineering—body structures group—develops reproductions of outside contours. These permit a visual interpretation of the completed part or assem-



Relationship between design engineering and production at Chevrolet

bly to disclose any manufacturing or production problems anticipated.

6. Concurrently cost estimates are developed for both piece prices and tooling; parts are analyzed by representatives of manufacturing, engineering, product planning, cost estimating, and others as appropriate, at meetings of the product committee. On this occasion determinations of those areas susceptible to utilization of newly developed techniques for low-cost production are considered.

 Concurrently engineering prepares preliminary drawings from clay mock-ups as developed, considering all suggestions and ideas generated from foregoing activities.

8. Preliminary drawings are submitted for production study to manufacturing engineering department.

9. Prints are reviewed for feasibility of production under existing known processes and changes or modifications are recommended either to assure feasibility of production under these processes, or to enable the employment of newer methods and techniques.

10. Outside suppliers are requested to review certain critical specifications or production problems which are either foreseen within the organization, or which the vendors point up as a result of reviewing preliminary prints.

11. Before final release of drawings for initiation of tooling, vendors submit proposed operational or tool line-ups to manufacturing engineering for review as

COORDINATION — Key to Successful Volume ... Continued Manufacturing

AUTOMOTIVE
Manufacturing Cycle

SUPPLIERS

MATTRICAL
PARTS

EQUIPMENT

PRODUCTION

a final check for accomplishment of practical and better production methods. Parts are then finally released by engineering, and design is "frozen."

On Packard chassis items, similar procedures are followed with suitable variations in detail because of the fact that parts may require stampings, die castings, forgings, castings, and machine shop operations as well. The general procedure in this respect may be briefly summarized as follows:

1. Similar procedures are followed for those parts classified as chassis items which are made as stampings or die castings. For machined parts or assemblies, preliminary blueprints are reviewed by manufacturing engineering, as previously described, as to production methods to determine how part is to be fabricated. At this time a review is made to determine if more modern equipment should be utilized to take advantage of new production methods.

2. Concurrently a "Make-or-Buy" review is interposed — generally on machined parts and assemblies (Packard does not fabricate many stampings)—wherein further consideration is given to new production methods that might be available at outside vendors vs. those captive facilities available.

3. Concurrently the preliminary prints, similitudes and other data are reviewed by the material handling engineer to determine if parts as released are susceptible to modern handling methods, and any design changes required for this purpose are earmarked be-

fore final release of prints. This applies to the Major Body section also.

4. Proposed vendors' operational line-ups are submitted for review, as described under the Major Body section. Upon completion of these activities, final release drawings are made and designs are "frozen."

This, then, is a small but representative sampling of how certain organizations dovetail engineering and manufacturing activities in the interest and well-being of the company.

Behind the scenes is an endless chain of committee effort working on various problems. Engineers and metallurgists, metallurgists and process engineers, engineers and production people, process men with factory department heads and superintendents, management executives conferring engineering and production executives. Basic part of the current economic picture, these conferences, even though they are not public knowledge, eventually result in the major decisions as to design, equipment buying, decisions as to what to make and what to buy. They affect not only the policies of the company but the fortunes of suppliers and parts makers as well.

With the consolidation of Packard and Studebaker, there will be still closer cooperation between departments. The combined skills and know-how should work to the advantage of both companies.

CONFIDENCE PRODUCT
PROGRAM

CONFORMATION MANAGEMENT
Approve

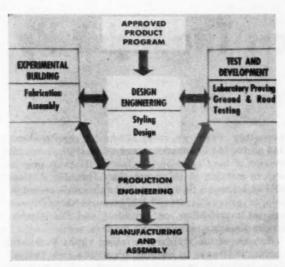
APPROVED PRODUCT
PROGRAM

Chief engineer's part at Chevrolet

CADILLAC . . . has Simplified System

Capitlac Motor Car Division has a relatively simple approach to the problem of coordination because of its compact "one-plant" operation with all facilities concentrated in a single unified area. It is, therefore, a relatively simple matter for production engineers to work directly with design engineers while new designs are still on the drawing boards. Thus they can make suggestions as to changes and modifications during the preliminary stages of design.

This process of constant contact and communication continues until both engineering and production men are mutually satisfied as to the most effective balance of design and manufacturing methods before engineering design becomes "frozen."



How the approved product program is handled at Chevrolet

MATERIALS
Are Important

W HAT is the role of materials, process, machine tools, quality control, and automation in the design and manufacture of parts and components? The situation is so complex as to defy anything but generalizations, and can be illustrated only by samples of individual cases. Since each phase of the operation has its own angles and importance, it is impossible to assign the leading role to any single factor.

The fact remains that materials, in general, play a major part in the scheme of things. Designers, in cooperation with chemical and metallurgical specialists, must keep abreast of developments in the field of materials if advantage is to be taken of what is available.

Engineering and manufacturing must work together to select the most suitable materials; the selection being based on many considerations such as cost, availability, strength, durability, machinability, etc. There is a growing appreciation of the light-weight materials—aluminum and magnesium. It is still too early to talk about titanium except for military aircraft applications. But some day titanium should play its part in automotive design. Aluminum and magnesium already have acceptance in the truck and trailer field where a pound saved is a dollar earned by the customer. The time is not far distant when these materials will be employed in much larger tonnages in passenger car and truck engines and other parts.

Structural aluminum and magnesium parts—sheet, rolled and extruded shapes—have shown the way in the building of truck, trailer and bus bodies.

The choice of materials often determines the process by which parts are to be fabricated. We refer to press stampings, die casting, permanent mold castings, extrusions, precision castings, etc.

Advances are being made in a wide variety of materials—rubber, synthetic rubber-replacing materials, silicone synthetics, fabrics, etc. Major advances have been made by plastics, particularly reinforced plastics. The latter are showing the way in applications such as the Chevrolet Corvette. In addition to sports car bodies, reinforced plastic is being used for making special vocational truck bodies (see AI, June 15, 1954) and at least one heavy duty truck model to be announced for 1955 reportedly will have a plastic hood and plastic front fenders.

Plastics also have found their way into press dies, die models, reproductions, small stamping dies, checking fixtures, large drill jigs, etc.

Powder metallurgy holds considerable promise. Besides pure iron and bearing mixtures with which most metallurgists are familiar, the art now affords aluminum, magnesium, zinc, steel alloys, hardenable steel fixtures, and stainless steels. Parts of intricate form, made from ordinarily unmachinable materials, can be made to exact size and finish, and require no machining. In addition to metals, powder metallurgy is actively engaged in the development of ceramics and ceramic-metal compositions for applications such as brake linings.

We need not dwell at length on structural steels which are consumed in enormous tonnages by the automotive industries. Metallurgists are thoroughly familiar with them. Nevertheless, the new techniques now available require close scrutiny of steel specifications. Specifications may have to be modified depending on the equipment and methods of heat treating or hardening.

Selection of material also may be governed by the adoption of newer techniques such as cold-forming or cold extrusion.

With mounting costs both of labor and materials, designers must look at processes that reduce waste and scrap and at the same time reduce the amount of machining. Cold extrusion, precision forging, impact extrusion (non-ferrous parts), and spinning by automatic machine methods promise attractive economies. Similarly, precision casting and shell molding in the foundry field (see AI, August 1, 1954), provide equally attractive possibilities. In general, such techniques reduce the amount of raw materials required to make the part, eliminate most of the scrap, and reduce the amount of metal removal in the machine shops.

MACHINE TOOL
Developments

ONSIDER now some of the latest developments in the machine tool field. Many of the most important advances have come as a result of close cooperation between automotive production engineers and machine tool manufacturers. Perhaps the biggest (Turn to page 110, please)

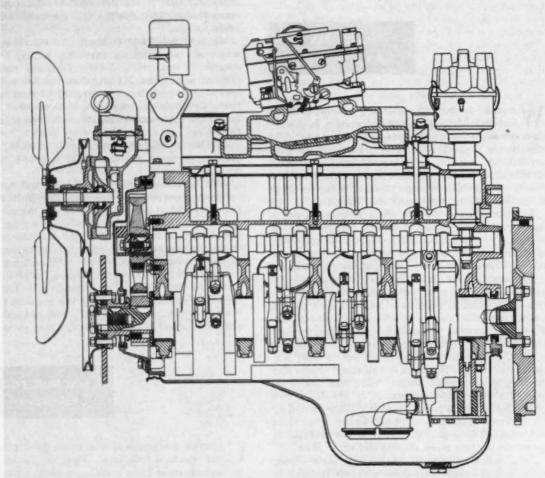
Studebaker Offers Two Higher Hp

Ror 1955 Studebaker has a line of President, Commander, and Champion cars, continuing the characteristic styling introduced last year. The President model designation marks revival of an old name discontinued at the outbreak of WW II, and replaces the familiar Land Cruiser, now discontinued. From a styling standpoint the major change is found in new front and rear bumper treatment, a new grille design, and a distinctive body molding. Interiors and instrument panels are entirely new.

Perhaps of greatest interest is the Studebaker en-

gine story: two V-8's, rated 175 hp for the President, 140 hp for the Commander; and a larger displacement version of the Champion Six, rated 101 hp. It may be well to mention at this point that all models disclose special attention to noise reduction, as well as reduction in exhaust system back pressure through new exhaust manifolding, on President and Commander, larger diameter tailpipes and mufflers.

Because of the increase in rating of the President engine, it is used in conjunction with a new Detroit Gear automatic transmission, similar in design to



Longitudinal section of the President engine. Intake manifold design is one of the principal differences between this and the smaller V-S.

V-8 Engines

those used heretofore but capable of handling 250 lb ft torque, offered as optional. All three automatic transmissions have controls similar to last year's Champion to provide starting in first gear.

Supplementing these major features are numerous changes and improvements in chassis and running gear. Of more than passing interest is the decision to offer tubeless tires as standard equipment, conventional tires being available at the buyer's option.

It is interesting to note that Studebaker capitalized on the intrinsic design advantages inherent in its

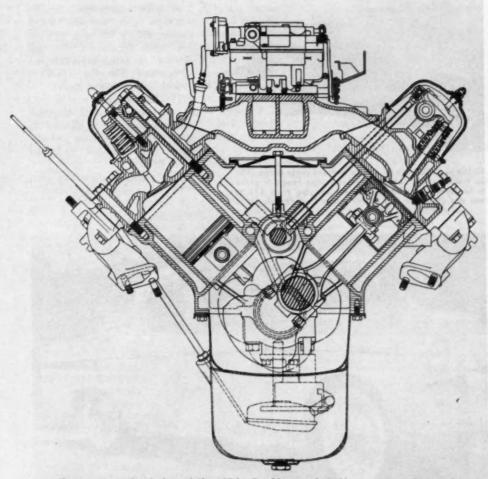
version of the V-8 to create two engines of different ratings while using essentially the same basic elements, except where noted. Moreover, the new engines not only retain the general design features of the former V-8 but utilize to the maximum extent the foundry and production equipment used heretofore.

Reference to the specifications table shows that the bore has been materially increased and is the same on both V-8's. The difference in displacement is accounted for by the difference in stroke, the President engine retaining the stroke of the former V-8. The cylinder block is the same as before, except for the change in cylinder barrel cores. From a manufacturing standpoint everything remains the same except for the size of boring and honing tools and a slight change in the bore for the tappets.

Interchangeability has been developed to a maximum degree. Connecting rods are the same for both engines and are interchangeable with rods for the previous engine. The crankshaft for the President

engine is the same as for the former model, except for the amount of balance required with larger pistons. The shorter stroke crankshaft for the Commander engine naturally is new, although main bearings remain interchangeable throughout.

Cylinder heads, which are new, are interchange able on both engines and feature fully machined combustion chambers. Valve diameters have been stepped up-1 21/32 in. nominal diameter for the intake valve; 1 17/32 in. for exhaust valves. This necessitated a change in valve spacing and a corresponding change in combustion chamber geometry. Pistons,



Transverse sectional view of the 175-hp President engine. Many components are the same in the engine of the Commander model.

Condensed Mechanical Specifications 1955 Studebaker Engines

Туре	PRESIDENT OHV 90-	COMMANDER	CHAMPION L-head
No. Cylinders	8	8	6
Bore (in.)	39/16	39/16	3
Stroke (in.)	31/4	213/16	43/8
Displacement (cu in.)	259	224	185
Compression Ratio	7.5 to 1	7.5 to 1	7.5 to 1
Bhp (max.)	175 @ 4500 rpm	140 @ 4500 rpm	101 @ 4000
Torque (lb ft) Max.	250 @ 3000 rpm	202 @ 2800 rpm	152 @ 1800
No. Main Bearings	5	5	4
Bhp/cu in. Ratio	0.675	0.625	0.546
Type of Fuel		Regular grade	



Automatic transmissions with the new V-8, 140 hp engine are available in the 1955 Stadebaker V2-ton and ¾-ton truck series. The 1955 series trucks range in gross vehicle weight from 4600 lb to 16,000 lb, with wheelbases ranging from 112 to 212 in. The three new engines are available in a power range from the six up to the new 175-hp. V-8.

naturally, are new. Although of the same diameter they differ in detail and, consequently, are not interchangeable. These detail differences arise from the use of connecting rods of the same length in engines having different strokes; also because of the difference in combustion chamber volume when using the same heads. Piston ring setup remains identical.

One of the basic differences between the two V-8's is in the induction ssytem. The President engine mounts a Carter four-barrel carburetor with a new intake manifold with individual passages; while the 140-hp version uses the same manifolding and carburetor as on the previous Commander engine.

Although the valves are mounted on wider centers, the rocker shaft and its bearing structure remains unchanged, except that the rocker arm pad is made wider. The camshaft is of Profferall alloy iron with wider cam faces—upped to ½-in. in width. Valve timing differs on both engines but the torsional vibration damper is interchangeable on all engines. The only difference now is in the timing marks.

The barrel type valve tappets are slightly smaller in diameter and are made of a hardenable alloy iron composition. Studebaker does not use hydraulic valve lifters.

Fuel pump location has been (Turn to page 114, please)



Commander Regal four-door sedan with the new 140-hp V-8 engine.

Incorporating

HUMAN ENGINEERING in Aircraft Design

By Frank C. Hale Research Engineer, Douglas Aircraft Co., Inc.

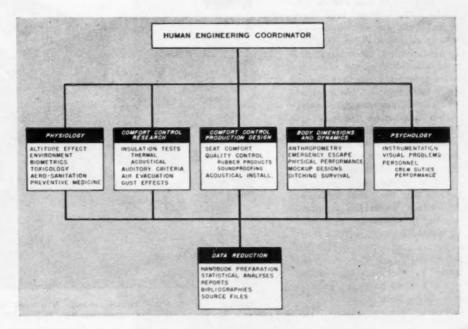
OMMERCIAL aircraft manufacturers have long been cognizant of the advantages of such human factors as comfort and safety when producing a competitive product. Basically, what we talk of today as human factors are simply amplifications of these two factors as they apply to the occupants of higher and faster aircraft. Just as no manufacturer would expect to produce a design which did not display the latest technical and scientific advances in aerodynamic thinking or communications, so also should this design incorporate the best of human factors thought.

The question arises as to whether the necessary human factors evaluations can be best accomplished through the use of outside consulting agencies or through the employment of permanent engineering division employees. There is little doubt that, specialist for specialist, a higher type of consultant can be obtained from outside agencies. However, there is the problem of economics involved in the permanent employment of these individuals. Whether permanent employees can offset this disadvantage through con-

tinuity of effort is a moot question. In the past most aircraft manufacturers have relied upon certain design philosophies to differentiate their aircraft designs from those of their competitors. In the commercial market, these design philosophies have become stock in trade, and their continuance a necessity for the manufacturer. The difficulties of imparting these philosophies to outside consultants, employed for only short periods of time and without intimate contact throughout the entire plant of the manufacturer is evident.

At the Douglas Aircraft Company's Santa Monica Plant, where the production of commercial aircraft is centered, a combination of both means is employed to arrive at human factors design answers. A group has been established within the interiors design section which serves to maintain a continuity of effort and philosophy. When problems arise which appear to be beyond the scope of this group, and the problems do not appear to warrant the addition of permanent personnel for their solution, the group serves as a nucleus whereby information is absorbed from specialists either from other Douglas plants or from consulting agencies and guided into channels of greatest utility to the efforts of the engineering designer. The greatest value of the group appears to be in this capacity of interpretation, the gathering of information on one side from the various human factors specialists, then on the other side translating and transmitting this same information into the language and form usable by the engineer.

(Turn to page 128, please)



AUTOMATIC CONTROLS Take Over

TUNE OVE

Applications Are Expanding Rapidly in Automation and Other Manufacturing Processes

With the rapid advances automation is making in reducing cost and improving quality in automotive manufacturing, the means of control are receiving close attention from the machine builder and user alike. The word "control" is consid-

ered to include electric, electronic, hydraulic, pneumatic or mechanical devices. These devices may be used with machinery or processing equipment of all types. They also may be used with automation.

This is the first article of a series devoted to some recent trends in use of controls for more nearly automatic manufacturing. Many new components and new applications for more conventional devices will be illustrated. The latest trends in design, procurement, and operation of controls also will be covered. It is believed that many recent developments in controlling machining, heat treating, metal finishing, assembling, and production testing are of immediate interest when they reduce costs and improve the product. In addition, proper control application can often increase the flexibility of expensive new plant equipment which on first glance might appear to be restricted to high-volume production runs.

The technology is changing so rapidly that the latest means of controlling a certain standard machining operation may well be revised at comparatively short intervals. Advances in control knowledge, and the entry of more "automation" suppliers into the field of packaged production lines help to account for this.

A Huge New Market

Up to 20 per cent or more of the cost of transfer type machines often is represented by electric control equipment—motors, control panels, limit switches,



Replacing an electronic circuit package in a vane sorting machine at Detroit Transmission Div., Willow Run.

By Paul C. Kennedy

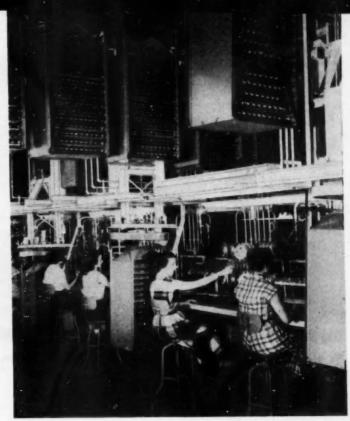
start-stop contactors, solenoids, relays, and so forth. The average is about nine per cent or about \$80 million for the automobile industry this year for all types of machinery. An additional amount is spent for hydraulic and pneumatic power cylinders and solenoids, gaging devices, and similar equipment. In 1954, expenditures for electrical equipment alone for plant applications by the automotive industries was estimated at over \$350 million, according to a recent survey. There are some 1000 firms making control equipment of all types for all industries, and they are doing an annual \$2.3 billion business.

The volume of control equipment required is illustrated by one transfer machine recently installed by Snyder Tool & Engineering Co. This 165-ft machine uses 57 electric motors, 75 hydraulic cylinders, 74 solenoid-controlled valves, 250 limit switches, 274 relays, and 29 miles of wire. Four console cabinets are required, with additional warning lights, operating switches and contactors. A telephone system for maintenance has plug-in stations at 10-ft intervals along the machine.

Classification

Controls are of interest largely for what they contribute to make a machine or process more nearly automatic. Manufacturing processes are often classified by the degree of automaticity achieved in the process itself, regardless of the degree of automation used to handle the workpiece. Also, a process may have several features that do not require a human operator, without being considered fully automatic. Even the definition of "automation" is not universal. Sometimes a particular process may be difficult to classify, but in general the following definitions are often said to apply to manufacturing processes.

Open-loop processes are, of course, the most common. The so-called loop, or sequence of control, includes a human operator who interprets a measuring device and accordingly sets an operating device. Open-loop processes may be manual or semi-automatic, depending on how much control is removed from the human

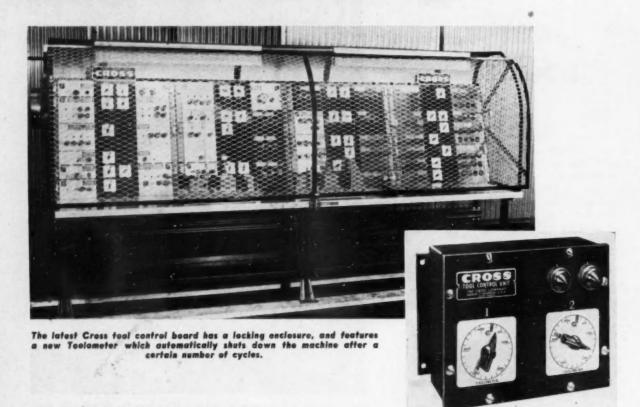


Racks stocked with automotive instrument parts in the subassembly area of AC Spark Plug Div. are earmarked for any one of 47 final-assembly stations. Destination is set electrically by the stock man, with a selecter switch near the top of the carrier which arranges confact points on the top. Air power raises the rack to a power-and-free conveyor with eleven switch trucks. Final assemblers set rack to any height with air valve. Interlocks prevent jam-ups.

All conveyors at the DeSoto Warren Ave. plant are controlled from one panel. If trouble develops a signal is flashed to intercom panels (shown) throughout the plant. An electrician answers the call and makes the the repair in minutes.



Automotive Industries, October 15, 1954

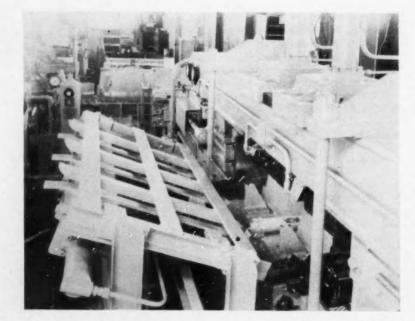


operator. As an example, a milling operation with automation for getting workpieces in and out is a manual open-loop process if the machinist controls the movements of the tool. The operation with tracer or other cutting cycle control, even with automatic cycling of workpieces through the machine, is considered to be a semi-automatic open-loop process. Most transfer machines, dial type machines, automatic chucking machines, and many specials are so classified.

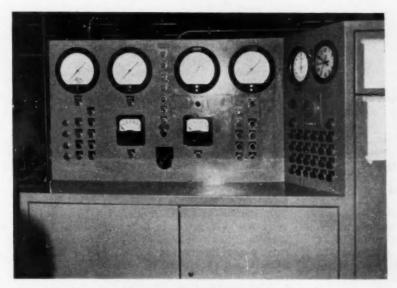
Usually a signal indicates offsize parts being produced, and the machine is stopped automatically for tool change.

In a refinement of this type of operation the tool adjusts itself for wear based on average or measured tool life. Several grinders with automatic sizing or crush-truing features come under this classification. An example is a new Norton crankpin grinder presently being installed in automotive plants. The grinding wheels are automatically trued up after a certain number of grinds. There is also an automatic adjustment for the re-

duction in the wheel diameter. The size of the crankpin just ground is gaged automatically while the workpiece is being removed to the next station. Signal lights tell the operator when additional adjust-



Simplicity is one key to successful automation control, as evidenced by standard components in accessible locations on this Eimes press for reducing onds of steering columns.



Many aircraft performance tests require extensive instrumentation. Two types of gear boxes on the J-65 jet engine are loaded with 250-hp motors. Speed control is provided by an eddy current clutch. Power load to one gear box is held constant at all speeds with another eddy current clutch. Various PTO's of the other gear box are loaded electronically with water brakes, a d-c generator, and a fixed electric load. Automatic cycling with many safety devices is included.

ments to the wheel should be made to keep the pin on succeeding workpieces within limits.

Closed-loop or feedback processes are not so common because of the cost, complexity, or lack of suitable components. In a feedback sequence of control, no human operator is required. A sensing device automatically interprets a measuring device and sets the operating control. Such an automatic operation in machining would have provision for correcting for tool wear through measurements taken directly on the workpiece. This type of operation can be said to be fully automatic.

The friction which must be overcome in starting a slide moving on its ways is one limiting factor in applying fully automatic controls to current machine tools, according to one builder. Controls are available, but they cannot operate most machine tools today with the accuracy of a skilled machinist turning a hand wheel.

Examples of feedback control are to be found in some precision grinding operations to be announced later in more detail. Electrolimit gaging



this National - Acme Snap-Lock are mounted on manifolds and have transparent covers on Cross machines.

Limit switches such as

CONTROL COMPONENTS FOR **PRODUCTION**

Electrical Electronic Mechanical Pneumatic Hydraulic

Switches

Line switches Start-stop contactors Limit switches Solenoids

Electric Motors

Cylinders and Pumps Proumatic Hydraulic

Meters, Gages

Instruments Indicating Recording

Timers

Counters

Speed Controls Electronic Magnetic amplifier

Control Panels Panels

Cabinets Junction boxes

Pyrometers and Radiation Devices

Transisters, thermisters

Thermocouples

Governors

Indicating Lamps

Valves

Light Sensitive Devices

Serves

Computers

Gaging Devices Mechanical Pneumatic Capacitive

Electronics Rectifiers Amplifiers

Mechanical Devices

Gears

Clutches and Brakes Magnetic Friction

equipment, made by Pratt & Whitney Div. of Niles-Bement-Pond Co., is used on Cincinnati Microcentric machines on finish grinding, to check the work in process. Corrections to the grinding wheel setting are said to be made nearly instantaneously.

Feedback control of continuous processes is, of course, well known. Examples include thermostatic control of heat treating furnaces, and maintaining liquid level in cleaning and plating tanks. Operating demand-type hopper feeds in finishing gears and small parts is an example in mechanical automation.

Prime Contractor Trend

A recent trend in procuring automation equipment is being accelerated by automotive manufacturers. Automation is sometimes called a new word for an old idea, but the customer is constantly redefining the term to suit his needs. Some manufacturers want to give the responsibility for designing, building, installing, and testing complete production lines or processes to one supplier. Several transfer machine buyers expressed this idea in a recent survey.

Increasingly, the manufacturer decides that a new type of special process is feasible for a particular job, and then looks for a supplier to take over the entire project. The manufacturer sometimes combines machines, automation, gaging equipment and controls and builds his own automatic process if speedy delivery of the complete unit cannot be promised by one of the equipment suppliers.

Increasingly, it is the customer who initiates an idea for equipment which has never been built before. Engineering groups with company-wide responsibilities for evolving new production ideas are being started or expanded. At Ford, the Manufacturing Engineering Group is charged with this function. At General Motors, a consulting group called the Process Development Section is available to all divisions to investigate possible new production methods. This section has built prototype and production machines when necessary.

On the other hand there are production equipment users who will prefer to have the various types of units built and furnished by specialists in each field. Even closer liaison and standardization of control methods and components is required in this case.

New Design Approach

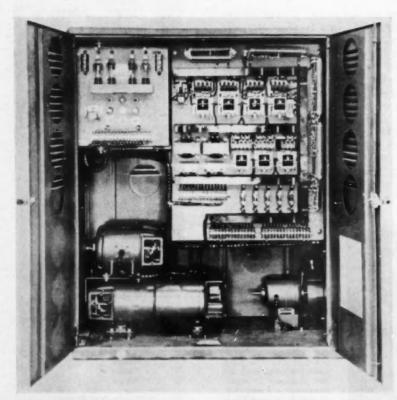
Machine designing for automation and automatic control has reached the point where a more philosophical approach is being taken in some quarters. A new symbolism is being developed and used to describe the requirements of manufacturing in a schematic way. One example is a system described at a recent Sym-

> posium on Automatic Production of Electronic Equipment, sponsored by the Stanford University Research Institute. It was explained by E. W. Leaver, of Electronic Associates Ltd., Willowdale, Ontario. The symbols are used to describe machines in terms of the information, energy and materials needed to perform each machining operation. Such a system helps the designer to return to basic manufacturing requirements, in order to take full advantage of machines which no longer must be built to fit the physical limitations of human operators.

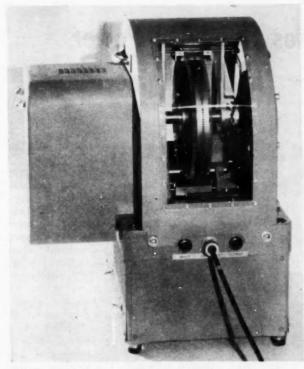
Operating Problems Solved

Maintenance problems undoubtedly increase with the greater complexity of new control systems. In general, these problems seem to depend on three factors: Education of maintenance men, ruggedness of control components, and complexity of design specifications.

Experience can replace education but that is the hard way. Several manufacturers, who are just getting into automatic



Improved control units feature protective channels for the cables, together with code numbers on wires and simplified wiring "diagrams without wires."



Hermetically sealed control components are more in evidence, as typified by this new Hayden adjustable time delay relay with a hermetic rotary seal.

machinery in a big way for the first time, are hoping to have key maintenance men fully trained by the time new machines are operating. They are asking for more complete diagrams and instruction books in advance. Particularly, they have said they want trouble-shooting procedure spelled out for easier understanding. Packard men have spent up to a month in the plant of a supplier of transfer machines being installed at the Utica, Mich., engine and transmission plant. The additional cost of such preparation is thought to be offset by increased efficiency and the savings in fewer calls for suppliers' service men in the future.

Studies in downtime scheduling are being made in greater detail than heretofore. During one particular program of a leading automobile manufacturer, the cost and the volume of downtime losses were cut in half. A detailed analysis was made of tool failures and normal tool lite, and the requirements for other types of service and preventive maintenance.

Improved control components are being included as a matter of course in more standard machines every day. A great stride was taken when the automotive manufacturers sponsored the Joint Industry Conference standards for machinery in general and control components and installations in particular. However, some companies have gone further in developing more durable devices. A recent program at Ford concerned designing more rugged junction boxes and solenoids. A better seal material and cemented seals or gaskets were specified. Many holes formerly required in junction boxes and relay covers were eliminated by weld-

ing on mounting lugs, name plates and hinges. Loose parts such as covers and screws were redesigned to make them captive.

Aircraft manufacturers increasingly are specifying JIC standards. An aircraft machine tool standards program also is under way.

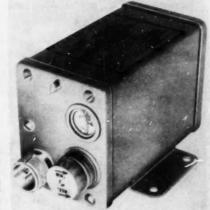
Certain suppliers are said to feel that some specifications being laid down by the customer are too stringent. One manufacturer is said to have requested individual knife switches for all wires entering control panels. This convenience for the maintenance man was finally eliminated because of the added cost, complexity and space required.

Role of Instrumentation

Instrumentation for measuring transient physical quantities is used considerably more in process work, in continuous-flow type production control, and in research than it is in piece production and assembly. However, many techniques are available to measure changing electrical and physical forces which might well be adapted to improve control of metalworking machinery and other manufacturing processes. There are a number of instrument accessories which are promising help to machine designers in various fields. The Pratt & Whitney proportional synchronizer made by Pratt & Whitney Div. is such a device, designed to store a meter reading of varying magnitude and reproduce the information at a

later period in the process. It is synchronized with the speed or operation of the processing line. In operation, a meter reading from a gage is applied to a memory unit through a self-balancing electronic control circuit, for use later. The synchronizer is being applied in the control of the welding current in forming strip steel into tubing. The welding current is varied in accordance with the thickness of the strip measured ahead of the weld point.

(Turn to page 138, please)



The proportional synchronizer, made by Pratt & Whitney, stores gage and meter readings

Thin Wall Ducting Carries Heat and Power in Jet Engine Planes

URBOJET engines in aircraft are a source of high pressure, high temperature air which is moving at swift velocities. This gas stream is made to order for meeting the air-conditioning and power needs of aircraft. For pressurizing and heating, air bled from the compressor section is the end commodity and little equipment is required to bring it into effectual use. For powering electrical, hydraulic and refrigerating systems, compressor-bled air can be efficiently employed throughout the aircraft.

Use of compressor-bled air provides fewer sources of power with greater dependability. If different types of power are required, such as different voltage electrical power, the system lends itself to these varied needs while electrical energy taken from a main engine drive does not have such flexibility. Another advantage is that the aircraft engines are kept aerodynamically clean because auxiliary components are removed from the front of the engines and placed inside the aircraft structure.

From one to three per cent of the volume of air compressed by the turbojet's compressor is usually required to meet an aircraft's needs. The air is drawn upon for power use—to operate landing gear, brakes, flaps, bomb bay doors, etc.—for intermittent periods of short duration and at times when the engines are not called upon to deliver maximum thrust. Under these condi-

tions the engines have a good reserve of air and the drain is not felt.

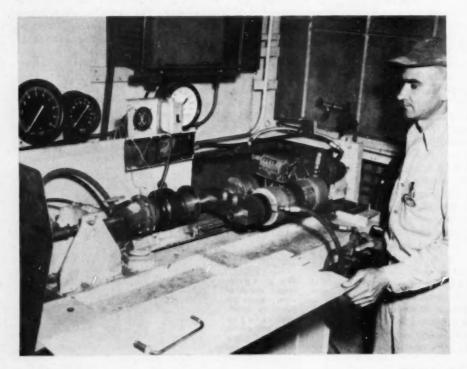
In order to efficiently feed an aircraft ducting system, the turbojets should be designed with these requirements in mind and with provisions for the production of extra quantities of compressed air. This means, of course, that engine designers must know well in advance what the requirements of new aircraft will be. Also, it imposes greater responsibility upon engine designers to match power plants with specific aircraft because the additional power requirements are indigenous to the airframe design.

Ryan Aeronautical Co. is devoting extensive laboratory and production facilities to the development of the thin wall ducting systems which deliver hot, compressed air to strategic points in modern aircraft.

Thin wall ducting must handle high temperature air under high pressures with velocities running to the speed of sound. Often designs must be capable of withstanding bursting pressures of from three to four times operating pressures. Temperature changes are so wide that extensive thermal expansion must be accommodated. Strength requirements are high and gas-tight integrity is the aim. Systems must be flex-

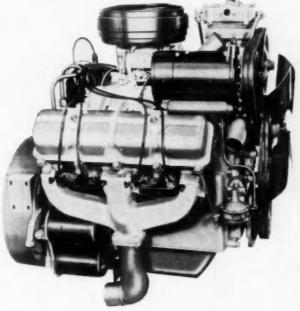
ible for installation purposes and resistant to corrosion and oxidation under all conditions of high and low temperatures. Because temperatures, pressures and velocities vary, it is mandatory that some custom design be accomplished in the development of each aircraft system.

The over-riding requirement which complicates all phases of the (Turn to page 146)



Ryan - designed flexible joints for thin wall ducting are subjected to rigorous tests in special fixtures which heat them, pump compressed air through them and measure any leakage which occurs.

REO Adds Two V-8 Truck Engines



Overall engine length is held to a minimum by design features such as compact accessory drives

REO TRUCK V-8 ENGINES CONDENSED SPECIFICATIONS

Model	OV-195	OY-220		
Туре	90-deg Ove	rhead Valve		
Bore (in.)	37/8	41/8		
Stroke (in.)	41/8	41/8		
Displacement (cu in.) .	390	441		
Compression Ratio	7.30 to 1	7.30 to 1		
Bhp gross (governed speed)	195 @ 3200 rpm	220 @ 3200 rpm		
Torque (lb ft) gross	345 @ 1800- 2400 rpm	400 @ 1600- 2200 rpm		
No. Main Bearings	5			
Firing Order	1-5-4-8-6-3-7-2			
Bhp/cu in	0.5			
Weight (lb) with accessories and flywheel housing	12	11		
Lb/bhp	6.2	5.5		

New Units Feature Reduced Length.

Many Parts Interchangeable With

Gold Comet Six Cylinder Engine

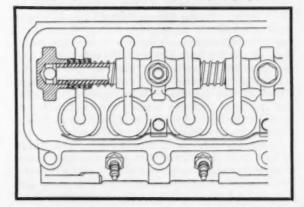
o meet legislative restrictions on the overall length of tractor-trailer combinations, Reo Motors, Inc. has just brought out two heavy duty, overhead valve V-8 gasoline engines for its maximum GCW rated tractor models. They are so compact for their output and displacement that it is feasible to install them in conventional type tractors with 96-in. length from the face of the front bumper to the rear of the cab without encroaching on the driver's compartment.

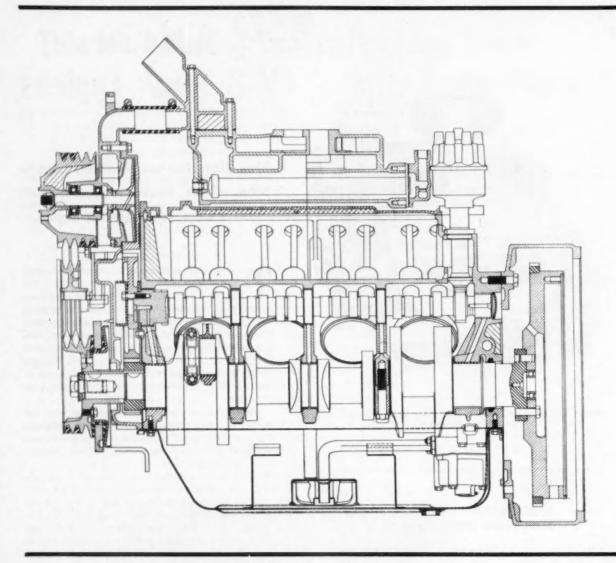
Of wet sleeve design, featuring the most advanced practice available to the engine designer, these engines provide considerable interchangeability of parts with the Gold Comet, six-cylinder engines through similarity of bores.

Judging from the specifications data, given in tabular form, these engines embody characteristics comparable with advanced passenger car V-8's, but of distinctively heavy duty design. For example, the ratio of bhp/cu in. is 0.5; and weight/bhp is 6.2 and 5.5 respectively. The compression ratio of 7.3/1 is strictly in line with modern day thinking and design.

Turning to design details, it may be noted that the square bore-stroke arrangement makes for an extremely compact and rigid cylinder block structure. The

Arrangement of rockers, rocker shaft, spark plugs, etc.





Longitudinal section of the OV-220 engine

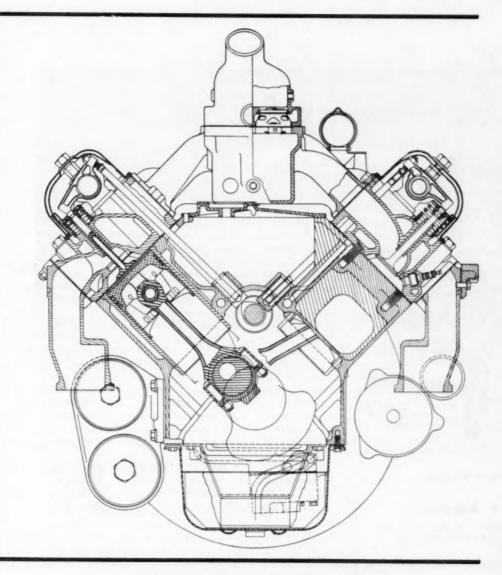
REO

block, of alloy cast iron produced by Campbell-Wyant-Cannon, lends itself admirably to modern foundry techniques since wet sleeve construction simplifies coring materially. Each of the five main bearing bulkheads is tied into the crankcase structure with massive webs and ribbing, thus contributing to rigidity and freedom from vibration. The wet type cylinder sleeves are of alloy cast iron with hardness ranging 187-228 Brinell, retained in the bore by the cylinder head gasket at the top, and two synthetic seals at the lower end.

Connecting rods are of forged I-beam type, made of SAE 1340 steel, fitted with precision type, interchangeable copper-lead, steel-back bearing inserts. The cam-ground aluminum alloy piston is quite distinctive, and features heavy duty construction in a

version of the Alcoa "optimum" design. It is of aircraft type with solid trunk and without slots. Special machining details produce controlled skirt flexibility. Ring setup consists of four rings: two, 3/32-in. wide compression rings, the top ring being chromium-plated; and two, 3/16-in. wide oil rings, all mounted above the piston pin center line. The piston pin is of full-floating design, operating in steel-backed bronze bushings, the pin being retained at the ends by lock rings.

The crankshaft marks another innovation for an independent engine builder. It is a cast crankshaft, made of alloy steel composition. Produced by Auto Specialties Mfg. Co., who have had many years of experience with cast cranks, it weighs 81 lb and is made so close to finished size as to reduce machining



Transverse sectional view of the OV-220 engine

operations considerably. Main bearings are steel-back, precision type copper-lead. Crank pins and main journals are Tocco hardened. The front-mounted vibration damper is of pre-loaded rubber type supplied by H. A. King Co.

Cylinder heads are of alloy cast iron, of compact, light-weight design, liberally water-jacketed for cooling. Each head weighs about 60 lb. Shrunk-in VSM steel inserts are provided for intake valves, Stellite faced inserts for the exhaust valves. In addition, Thompson-Products Rotocaps are installed on valves. Intake and exhaust valve stem guides are of bronze and are removable. Intake valves are of Silchrome steel with head diameter of 2.004 in., and seat angle of 30 deg. Exhaust valves are of Silchrome steel, sodium-cooled, Stellite-faced. Head diameter is

1.796 in., valve seat angle 30-deg. The 14mm spark plug is located at the outside corner.

The camshaft is of Profferall "A" cast iron, supplied by C-W-C. It is mounted on five, steel-backed babbitt bearings, thrust being taken on a thrust plate at the No. 1 bearing. Push rods reaching to the rocker arms at the upper end are actuated by means of barrel type valve tappets. made of heat treated alloy iron. Rocker arms are drop forgings of SAE 1045 steel, ratio of valve lift to cam lift being 1.4 to 1.

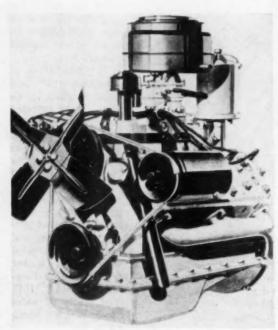
Arrangement of the induction and exhaust systems is quite similar to that of the latest types of big passenger car engines, with suitable modifications, of course. For example, the one-piece intake manifold is of overand-under branch design, so developed as

to provide the shortest and most favorable distribution of mixture to the various cylinders. It provides for water heating of intake mixture, contains ribbed surfaces within the cavity to facilitate heat transfer to the mixture. The manifold is cored at its lower side to contain an oil cooler of exceptional capacity, composed of 800 linear inches of ¼-in. crimped copper tubing. Another interesting design feature of the manifold is the provision of steel vanes cast in place within each distribution passage under the carburetor, effecting almost perfect distribution of mixture at the intake branches.

The exhaust system is composed of two separate manifolds, one for each bank, communicating with individual mufflers through separate exhaust pipes.

(Turn to page 178, please)

New French Fords Have Long-Stroke V-8 Engine



Aguillon model V-8 engine

By W. F. Bradley

Special European Correspondent for AUTOMOTIVE INDUSTRIES

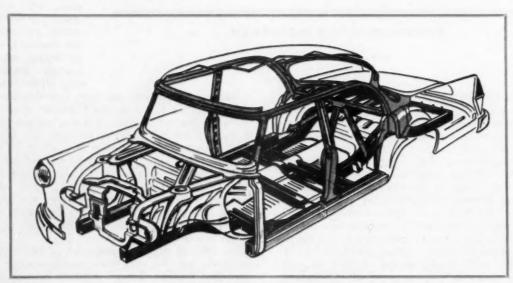


PARIS, FRANCE

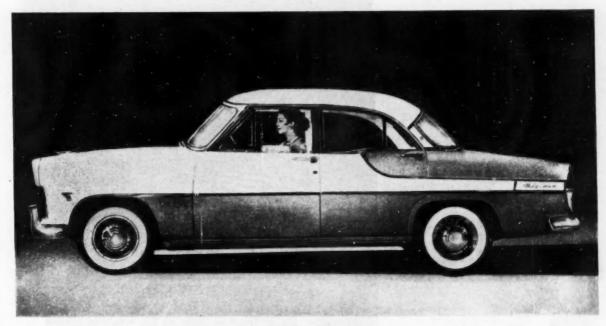
Rord of Poissy, France, has gone to the Court of Louis XIV for the designations of the 1955 models to be shown to the public for the first time at the Paris show. They are the Trianon, the Versailles, the Regence and the Marly. With the exception of the Marly station wagon, all are six-passenger sedans on a 106-in. wheelbase chassis. The Trianon is the standard model; the Versailles is a luxury type, and the Regence is a super-deluxe model.

All four models are built around the new Aquillon L-head V-8 engine of 143.6 cu in. piston displacement. It has a bore and stroke of 2.6 by 3.375 in., and a compression ratio of 7.2 to 1. Output is 80 hp at 4600 rpm and 110 lb ft torque at 2200 rpm. The engine has a three-bearing crankshaft, rotating type valves and adjustable pushrods, a single water pump, autothermic pistons with three rings and pressure lubrication to all main, connecting rod and camshaft bearings. The carburetor is a Zenith dual downdraft ND IX model with oil bath filter.

Drive is taken through a single plate clutch and a conventional three-speed transmission. A rear-axle ratio of 3.9 to 1 is standard with the exception of the station wagon, which may have a lower ratio. Front



Integral body and frame construction



French Ford Regence model

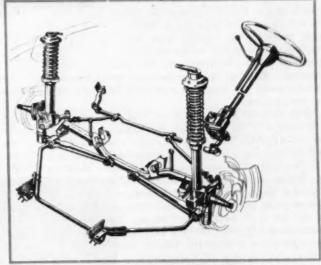
suspension is the independent MacPherson type as used on the English Fords. Rear suspension is by semi-elliptic springs with built-in lubricators. Steering is Gemmer, built in France.

As in the past, all bodies are built by the Chausson Co. In place of the conventional chassis frame with a one-piece body welded to it, Ford has adopted a unitized body with integrated frame. The two side members and all the cross members are box section. There is a strongly braced bulkhead, and the girder type body shell has a reinforced roof and box type body rocker panels fitted over and welded to the box-section side rails. Largely owing to this new construction, weight has been reduced to 2260 lb, for cars having overall length of 177 in., overall height of 58.5 in., overall width of 68.2 in., tread 54 in. front and 53 in. rear. Extra low pressure tires of 6.40-13 on pressed steel wheels are used.

Styling features a high, continuous fender line, a practically flat hood, headlights set in the front of the fenders and oversize tail lights in the rear. Visibility is unusually good, with curved windshield and narrow columns, and a big, curved rear glass.

All models can be supplied at extra cost with the Vista-dome sliding, transparent plastic roof, allowing the roof to be opened to any desired degree, or completely closed by an inner sliding panel.

Now a part of the Simca organization, Ford retains



MacPherson type front suspension

manufacturing independence under the general management of F. C. Reith. While there is the possibility of some manufacturing integration, this is not likely to take place at an early date. Simca and Ford produce entirely dissimilar non-competitive models. For 1955 the Ford program provides for the production of 45,000 passenger cars, in addition to trucks, powered by the French-built Hercules Diesel engines.



NATIONAL METAL SHOW

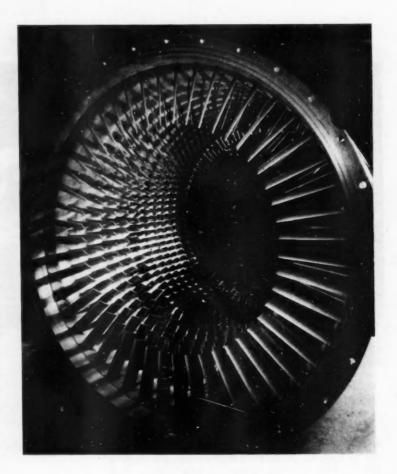
ANOTHER great industrial event is assured when the National Metal Exposition opens November 1 at the International Amphitheatre in Chicago. Approximately 263,000 sq ft of space will be utilized there by 445 leading firms in the metalworking field to display new products, new processes, and new

services. Many of the new products and other new developments are described and illustrated beginning on the next page.

The National Metal Congress, held each year concurrently with the Exposition, will again be sponsored by the American Society for Metals, American Welding Society, Society for Non-Destructive Testing, and the Institute of Metals Division, American Institute of Mining and Metallurgical Engineers. The 1954 National Metal Congress and Exposition, which ends November 5, is the 36th annual event and the ninth of the series to be held in Chicago. Last year the Congress and Exposition were held in Cleveland with the attendance passing the 100,000 mark.

Headquarters for the participating technical societies are: Palmer House—American Society for Metals; Hotel Sherman—American Welding Society; Morrison Hotel—Society for Non-Destructive Testing and Institute of Metals Division, AIME. Technical sessions of the four societies will be held at their respective headquarter hotels.

On Saturday and Sunday, October 30 and 31, the American Society for Metals will hold its annual Seminar, both morning and afternoon sessions. The subject of the 1954 Seminar is "Imperfections and Impurities."



Beginning Monday, November 1, the American Society for Metals and the American Welding Society will hold morning, afternoon, and evening technical sessions in meetings at their headquarter hotels. The Institute of Metals Division, AIME, will hold daily and evening technical sessions beginning Monday and continuing through Wednesday. The Society for Non-Destructive Testing will hold morning and afternoon sessions Monday through Friday.

The American Society for Metals will hold its annual Metallographic Exhibit during the entire week. Micrographs and macrographs displayed in this Metallographic Exhibit will qualify their owners in a contest for substantial recognition as well as a cash award for the best entry.

The annual meeting of the American Society for Metals will be held Wednesday morning, November 3, in the Grand Ballroom of the Palmer House. At that time George A. Roberts, vice-president, Vanadium-Alloys Steel Co., will be installed as the new ASM president.

The ASM annual banquet will take place Thursday evening and the program will include presentation of the ASM annual awards to the 1954 winners. William E. Umstattd, president of Timken Roller Bearing Co.,

(Turn to page 184, please)

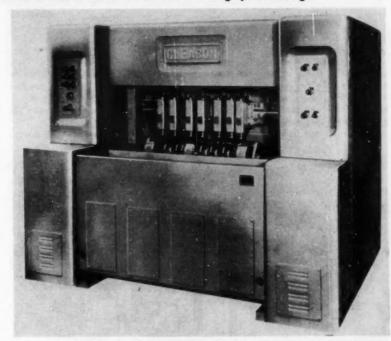
FOR ADDITIONAL INFORMATION, please use postage-free reply card on page 97

Machines Grip Parts to Minimize Distortion During Quenching

A CCURATELY controlled quenching of round, flat, shafted, or irregular parts is provided by a series of quenching presses to be exhibited. These machines are designed to hold and align heated parts during the quenching process, so that they may be hardened with a minimum of distortion. The quenching cycle is completely automatic.

The quenching oil is forced uniformly over and around the heated part. The rate of flow can be accurately controlled at all stages of the quenching cycle. Each press has a built-in pumping system and oil reservoir, thus reducing the external oil requirements to a minimum. Any of the machines can be arranged to use water, caustic soda, or other quenching medium, if desired.

Presses for flat, round and irregular parts are available in three sizes to accommodate parts up to 36 in. in the maximum dimension. In these presses the heated part is held between two dies while the quenching takes place. Ring parts are held round and concentric by the expansion of an assembly of segments within the bore or by contraction on the outside diameter. Relative pressures exerted on the various portions of the



The Gleason Rolling Quench Machine for Shafts, featuring automatic cycling and fluid control.

work are accurately controlled. Flow of the quenching oil to any part of the work also can be held to close limits.

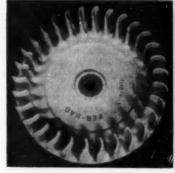
The machine for quenching shafts or similar parts operates by rolling the part under pressure during the quenching cycle. Roller pressures are pre-set by the operator, and are automatically controlled. The direction of flow of the quenching fluid, and the volume, up to 350 gpm, also can be adjusted for each job.

The Gleason Rolling Quench Machine will handle shafts or other similar parts from 9/16 to four in. in diameter, and from six to 43 in. in length. Parts with integral gears, cams or shoulders up to eight in diameter can be accommodated.

Changing of the work on the quenching presses for round, flat or irregular parts is facilitated by the sliding lower die mechanism, which automatically swings out from under the upper die for loading and unloading, and swings back for quenching. Gleason Works. Booth 454.

Circle 27 on postcard for more data

Bonded Magnesium and Aluminum





For lightweight military gasoline engines, Fer-Mag flywheels have ferrous rim and hab molecularly bonded to cast magnesium web and blower fins (left). Al-Fin aircraft generator and motor housings (right) are of cast aluminum with bonded in pre-formed tubes for coolant oil and stator lamination stackings. (Fairchild Engine and Airplane Corp. Booth 2070)

Circle 26 on postcard for more data

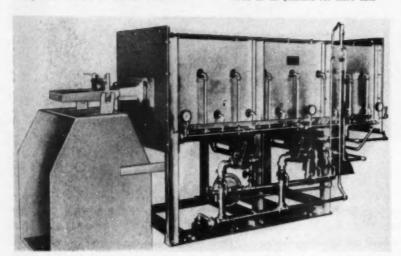
FOR ADDITIONAL INFORMATION, please use postage-free reply card on page 97

Reciprocating Hearth Furnace

To be shown is a patented reciprocating hearth furnace, model 230, which is said to be suitable for controlled atmosphere production heat treating of stampings, screw machine parts, forgings, etc.

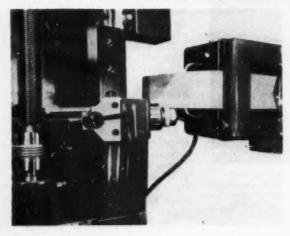
The furnace employs a movable alloy hearth within a fully sealed stationary muffle to convey the work through the processing cycle. The discharge throat of the muffle seals directly into the quenching medium. Alloy life is said to be increased because the muffle floor is not intermittently quenched by cold work. Quiet operation is achieved by the use of simplified drive mechanism and by the reciprocation of only the relatively light work conveying hearth. The drive is equipped with a visible speed indicator and regulator. New style reciprocating hearth furnaces are now available in capacities up to 600 lb per hour. American Gas Furnace Co. Booth 8430H.

Circle 28 on postcard for more data



Delicate work pieces can be moved through the model 230 reciprocating hearth furnace, according to the maker.

Electronic Gage Head

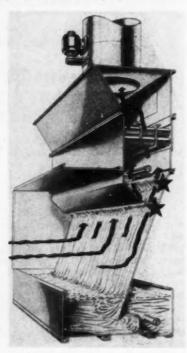


The Talymin III electranic gage head tea-tures axial or side action, and magnification variable from 100 to 5000. With an amplifier and record er, it is suggested to provide a permanent record of leadscrew error (shown) and to determine out - of roundness or flatness (Engis Equipment Co. Booth 1629)

Circle 29 on postcard for more data

Spray Booth Wash

WATER wash spray painting booth style D was designed as a lowcost, approved exhaust system for general use. Overspray and fumes



Binks style D water wash spray booth

from painting operations are drawn through two separate washing operations. Velocity of the air passing through the wash chamber never exceeds 600 fpm. The cleaned air then passes through a series of staggered arrestor plates which remove free moisture before the air is exhausted to the outside.

The circulating pump forces water from the collecting pan through a special manifold which sprays it in two directions in an unbroken curtain. Excess water passes the manifold and returns to the collecting pan. This continuous circulation flushes the manifold. Overspray striking the curtain is washed into the collecting pan.

This pan acts as a reservoir for the recirculating pump and as a collection place for vehicle and pigments. The pan is divided into two chambers by a removable divided plate. This plate traps most of the paint pigment in the front section where it can be reclaimed. Water reaching the circulating pumps is substantially free of paint sludge. Standard booth sizes range from four to 20 ft in width and seven to 12 ft in height. Binks Mfg. Co. Booth 420.

Circle 30 on postcard for more data

Two Tin Alloys

Tin-Nickel alloy, a newcomer in the field of metallic coatings, will be displayed on automotive parts. The alloy, in the proportion of two parts of tin to one part of nickel by weight, is electro-deposited at a constant composition from a solution of the mixed fluorides and chlorides of the two metals. It contains no "free" tin nickel. Tin-nickel alloy gives a silvery but faintly rose-colored, decorative and protective finish to steel, brass and copper.

Tin zinc will also be shown on radio components. A combination of 78 per cent tin and 22 per cent zinc is being used on automobile brake parts, motorcycle parts, steel parts of aircraft and refrigerator units. The deposit is said to be fine-grained and smooth, and to give good corrosion protection to complicated shapes in sheet steel. Moreover, the plated sheet can be pressed into forms without any serious loss of protective value. A prime advantage of tinzinc alloy coatings is that they can be easily soldered. The Malayan Tin Bureau. Booth 1909.

Circle 31 on postcard for more data

Silver Brazing

An operating exhibit featuring Easy-Flo and Sil-Fos silver alloy brazing and other silver products having growing industrial uses will be shown. On a production job the brazing alloy will be preplaced and the parts to be joined will be heated automatically as they pass through a heating zone. At another station torch heating will be used to demonstrate the versatility of silver alloy brazing. Case histories from various parts of the country will be displayed. Handy & Harmon. Booth 342.

Circle 32 on postcard for more data

Carbide Products

CEMENTED carbide tools and blanks, including standard and special blanks in various grades; dies, cases and nibs; clamp-on blanks, pulley grooving blanks, reamer blanks, square, round and triangular inserts; wear parts; Hevimet, in two grades; high-temperature vacuum-melted specialty alloys, many grades of cemented carbides, and thermistors, including disks, washers, rods and special high-temperature rods, are among the many features of the exhibit by Carbolog Dept. of General Electric Co. Booth 1540.

Circle 33 on postcard for more data



The Wheelabrator Swing Table airless blast cleaning machine for large or small castings, forgings, heat treated parts, weldments, or stampings.

Swing-Table Blast Cleaning Machine

THE 72-in. table-type airless blast cleaning and peening machine will be in actual operation. It is said to be distinct from other swing-table-type machines in that it requires no pit for the abrasive hopper.

The plain work table is mounted on the door of the machine. When the door is open, the work table comes out of the machine for ease in loading and unloading. When the door is shut, the table automatically moves into the blasting zone of the machine and rotates the work under the abrasive blasts from a rotating, bladed wheel mounted in the cabinet roof.

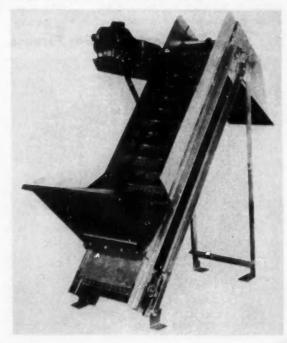
The machine has a 40-in. work height clearance and is meant to handle a wide range of work. American Wheelabrator & Equipment Corp. Booth 632.

Circle 34 on postcard for more data

Variable Loader for Small Parts

In operation will be the Metering Loader, capable of metering to any continuous conveying mechanism from 100 to 5000 lb per hour of small parts with a variable speed drive. Also shown will be a gas fired hot salt or hot oil quenching unit for 300 to 800 F, for martempering and austempering. (Industrialing Heating Equipment Co. Booth 1755)

Circle 35 on posteard for more data

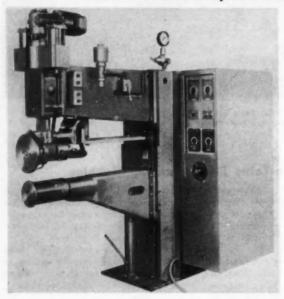


NATIONAL METAL SHOW

November 1 to 5 CHICAGO

FOR ADDITIONAL INFORMATION, please use postage-free reply card on page 97

Line of Seam and Spot Welders



The MP 2 single phase seam welder is one of a complete series of air operated, press type, low impedance welders. Frame sizes range from 1 through 5, and from 50 to 500 kva. Similar spot welders range from 30 to 50 kva. Three phase spot welders ranging from 50 to 500 kva also will be shown. (Sciaky Bros., Inc. Booth 435)

Circle 36 on postcard for more data

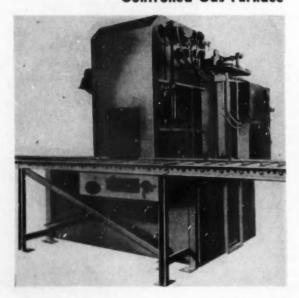
Vacuum Furnace

SMALL tilting-type vacuum melt-A small thing-type vacuum meit-ing furnace will be in actual operation. It will be of 30-lb capacity, and after the show will be installed

for making investment castings of vacuum-purity metal on a regular production basis. F. J. Stokes Machine Co. Booth 2167.

Circle 37 on postcard for more data

Controlled Gas Furnace

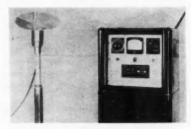


The M-400 is the smallest of three batch-type controlled atmosphere furnaces gas carburizing, carbonitriding, clean hardening and carbon restoration. Features include sealed cycle operation with forced uniform quenching from atmosphere. It has a gross heating rate of 400 lb per hour. (Dow Furnace Co. Booth 1041)

Circle 38 on postcard for more data

Disk Spray Reciprocates

ISPLAYS of the latest products to be painted with a disk-type electrostatic spray will be the feature of an exhibit of reciprocating spray



A pedestal mounted Ransburg disk-type head and control unit.

heads. Double inclined disks, a 48-in. hydraulic reciprocating mechanism on which spectators can vary the speed and length of stroke while in operation, and a single head atomizer with auxiliary electrodes to shape the spray pattern, also will be shown. Ransburg Electro-Coating Corp. Booth 235.

Circle 39 on postcard for more data

Measures Conductivity

THE Magnatest FM-102 low range conductivity meter is designed to give direct measurements of the electrical conductivity of non-ferrous metals and alloys such as lead, lead babbitt, tantalum, titanium, and zirconium. Conductivity measurements can easily be determined on ingots, billets, castings, forgings, and stampings. It is said to make possible sorting parts made from two or more alloys, and checking the heat treat condition of various pieces providing the conductivity changes with difference in heats. Applications include checking hardness of titanium since the measurement is nondestructive, and the separation of high temperature jet engine alloys by simple conductivity measurements.

A magnetic method for obtaining thickness of flat iron and steel sheet will be demonstrated. It is designed to measure sheet thickness from zero to .050 in. The portable meter operates entirely on the energy expended by placing its probe (magnet) on the sample being measured. A hand held permanent magnet probe is placed on the sample to be measured and the thickness is read directly. Accuracy is claimed to be within ±0,0005 in. when used on vitreous enameling steel, hot rolled, cold rolled, and deep drawing steel sheet. Magnaflux Corp. Booth 1315.

Circle 40 on postcard for more data

Measures Thickness, Flaws

VIDIGAGE is the name given to an ultrasonic gage for measuring thickness and internal flaws in metals, plastics and other materials. It uses



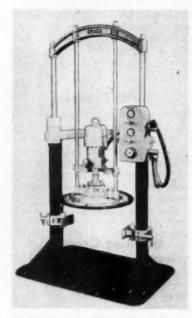
The Branson Vidigage

: 21-in, television tube. Adjustments are said to make possible readings of thicknesses from 0.012 to 2.5 in, directly with an accuracy of 0.1 per cent. Thickness up to 10 in, can readily be calculated.

A two-kw ultrasonic generator for cleaning and degreasing large or small parts also will be shown. The vibrating element can have an area up to 100 sq in., and can be mounted in a tank of any size. Branson Ultrasonic Co. Booth 2244.

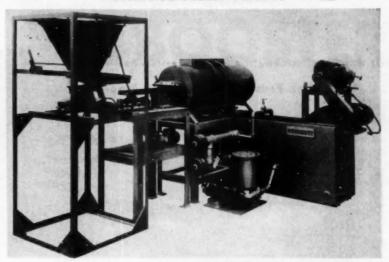
Circle 41 on postcard for more data

Drum Cleaner



Body sealants can be handled with an air powered ram follow plate and drum cleaner to be shown. A 20-to-1 Magul pump is used. (Gray Co. Booth 2145) Circle 42 on postcard for more data

Automated Shaker Furnace



Quench-O-Trol ail temperature control is a feature of automated shaker hearth furnaces to be shown. A hopper feed takes the parts to the furnace, and a quench tank conveyor removes the parts. Standard sizes have capacities up to 175 lb per hour.

(Hevi Duty Electric Co. Booth 247)

Circle 43 on postcard for more data

Hot Rollers

M ODELS of silicon carbide radiant tubes and rollers that have permitted continuous movement of materials through furnaces at tempera-

tures up to 2400 F, will be displayed. They are for use on Gasmaco radiant tube and roller hearth furnaces. Gas Machinery Co. Booth 854-C.

Circle 44 on postcard for more data

Hardening Is Electronically Controlled

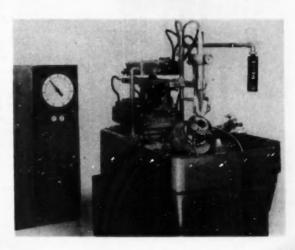
On the No. 1 gear surface hardener oxy-acetylene flames traverse each tooth separately. An electronic balancing mechanism translates radiant energy from a pyrometer into forces which control the travel of the burners. Operation is automatic after the optimum hardening temperature is pre-set.

Normally the machines are indexed

so that the teeth hardened successively are non-ad acent. However, water or oil quenching can be used. Adjustments are provided so that streams of coolant can be directed as close to or as far from the heating point as desired. Special burners with cooling orifices can be used. Gleason Works. Booth 454.

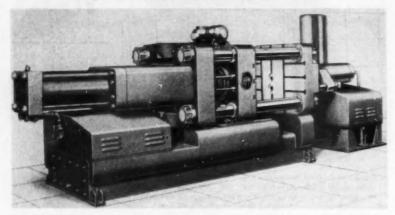
Circle 45 on postcard for more data

Gleason gear surface hardeners are adapteble to straight bevel, spiral bevel, Zerol, spur, herringbone, or helical gears.



FOR ADDITIONAL INFORMATION, please use postage-free reply card on page 97

High Pressure Die Casting Machines



First showing will be made of a cold chamber, high pressure die casting machine line that features an improved clamp and injection ends. Hydraulic-mechanical clamp is preloaded and lubricated automatically. Injection end is a self-contained unit, including pump, motor and reservoir. (Hydraulic Press Mfg. Co. Booth 109)

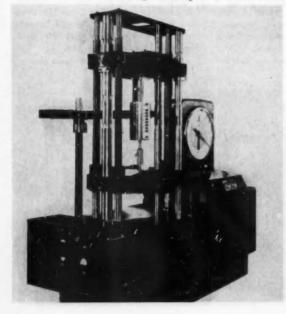
Circle 46 on postcard for more data

Stainless Casting

YENTRIFUGAL castings made from J V2B stainless steel alloy will be shown. This is a hardenable 18-8 alloy, which can be hardened and maintain its corrosion resistance. It is non-galling and does not lose hardness at higher temperatures. Beryllium copper centrifugal castings will be shown. They are said to offer strength, hardness, conductivity, corrosion resistance, non-sparking and non-magnetic characteristics. Janney Cylinder Co. Booth 1767.

Circle 47 on postcard for more data

For High Temperature Testing



A Riehle screw-pow-er universal testing machine features an electric furnace tachment to produce temperatures up to 2200 F. It takes specimens from 0.252 up to 0.505 in. in diameter. It provides positive testing speed control, and maintains a constant rate of strain at any set speed. A creep rupture testing machine also will be demonstrated. (American Metals, Machine and Inc. Booth 1248).

Circle 48 on postcard for more data

Magnetic Dies for Perforating

AGNETIC perforating dies will be demonstrated for materials up to 4-in. mild steel. Two blank templets are bored to admit the assembly of the punch and die units. Upon completion of any one job, the punch and die parts are removed and the templets stored. Punch and die units are available in standard sizes from 1/32 to three in. diameter and also in oval, square and rectangle shapes. Special sizes and shapes can be made to order. S. D. Whistler & Sons, Inc. Booth 135.

Circle 49 on postcard for more data

Leaded Alloy Steel

MPROVED machinability of alloy steel to which a small percentage of lead has been added will be demonstrated. The alloy is a .40 carbon chrome-molybdenum steel marketed under the trade name of Rycut 40. It is said that the principal effect of the lead, which in percentage ranges from 0.15 to 0.35 per cent is to act as a lubricant between the cutting tool and the chip. The reduced friction permits higher machining speeds, the increase ranging from 25 to 75 per cent. Other advantages claimed for the lead addition are fast breaking chips with no build up on the cutting tool, cooler cutting with life of cutting tools increased as much as 300 per cent, less power required, and a better surface finish on the part machined. Joseph T. Ryerson & Co., Inc. Booth 730.

Circle 50 on postcard for more data

Finish Process

PROCESS which makes it possible A to phosphatize steel and still apply silicone finishes will be displayed. The process built around Divobond is reported to clean, rustproof and give greater finish adherence to the metal all in one spray application. Diversey Corp. Booth 1718.

Circle 31 on postcard for more data

Grinding Coolant

PORMAL introduction of Triple C grinding coolant will be made. Also to be shown are Kroslok face milling cutters and shell end mills, and Triple-Chip saw blades of various sizes. The Motch & Merryweather Machinery Co. Booth 2160.

> Circle 52 on postcard for more data (Turn to page 162, please)

BOOSTERS

- Save space, weight and investment cost by replacing pump installations in many applications
- · Less costly to install, operate and maintain
- Hold pressure indefinitely without the motion and heat generation of ordinary pump circuits
- Provide at point of cylinder thrust more efficient power with less weight in less space than direct driven air cylinders
- Save up to 95% of air consumed by direct driven air cylinders
- Operate at speeds of 30 to 450 strokes per minute

NOTE: In addition to its most complete line of "Custom-Built" Boosters available on normal delivery, Miller offers 5" bore, 25 to 1 ratio, boosters for Immediate delivery in either 6" or 12" stroke. Write for data and prices.



DETALLY RECOMMENDED FOR

- WELDING
- PUNCHING
- SHEARING
- CLAMPING
- RIVETING
- CRIMPING
- PRESSING

and similar applications

200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.

FULL DETAILS IN MILLER BULLETIN B-200 SENT FREE ON REQUEST Other Miller products include: Air cylinders, 11/2" to 20" Bores,

SALES AND SERVICE FROM COAST TO COAST

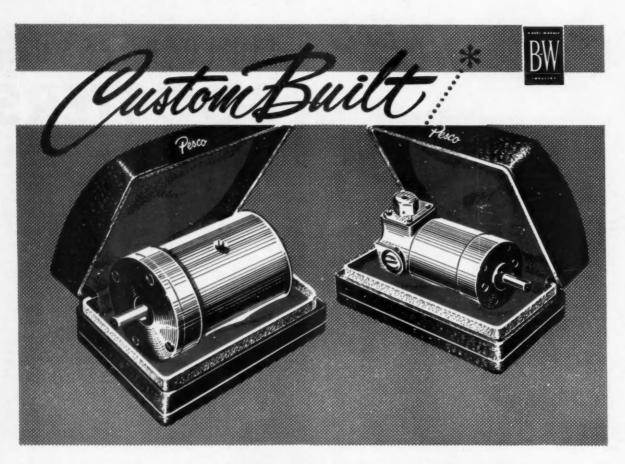
CLEVELAND • YOUNGSTOWN • DAYTON • PITTSBURGH • PHILADELPHIA • BOSTON • HARTFORD • NEW YORK CITY • BUFFALO • ST. PAUL • GRAND RAPIOS • DETROIT • FLINT • FORT WAYNE • SOUTH BEND • INDIANAPOLIS • MILWAUKEE • LOUISYILLE • KANSAS CITY • SEATTLE • LOS ANGELES • SAN FRANCISCO • BALTIMORE • DENVER • ST. LOUIS • MOLINE • CHICAGO • HOUSTON • TORONTO, CANADA and OTHER AREAS



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*WITH STANDARDIZED PARTS

Pesco "coordinated-frame" electric motors provide you with several important advantages.

First, they provide maximum power packaged in a minimum-sized unit to meet every installation and operating requirement from .01 to 11.0 horsepower.

Second, by using standardized Pesco parts in a series of coordinated frame sizes, Pesco lowers unit cost and greatly simplifies the stocking of service parts.

Finally, Pesco motors are supplied for DC or AC in a full range of voltages. DC motors are available with Series, Shunt, or Compound windings, 6 to 120 volts, 1/100 to 11 horsepower, and speeds up to 15,000 rpm.

Pesco AC high frequency induction motors of the squirrel cage type are available in 1 or 3-phase types for 400-cycle operation at various voltages. These motors range from 1/100 to 9 horsepower at speeds up to 12,000 rpm. Motors are produced in all types of enclosures for continuous or intermittent duty.

When your electric motor requirement demands (1) dependable power, (2) minimum space, and (3) minimum stocking of service parts—YOUR BEST BUY IS PESCO.

Call or write the Home Office, Bedford, Ohio for full information on these outstanding PESCO products.















PRODUCING THE BEST IN HYDRAULIC EQUIPMENT AND ELECTRIC MOTORS

BORG-WARNER

CORPORATION

Can simple design changes help cut your gasket costs?



17 helpful sections, including:

- DESIGNING FLANGES FOR EFFICIENT SEALING
- SEALING WITH CONFINED RESILIENT GASKETS
- **EFFECT OF GASKET WIDTH ON COMPRESSION**
- RELATION OF GASKET THICKNESS TO LOAD
- DESIGN PROBLEMS PECULIAR TO RUBBER GASKETS
- EFFECT OF SURFACE CONDITIONS ON GASKETS
- PRACTICAL TOLERANCES FOR GASKET MATERIALS

ARMSTRONG'S GASKET MATERIALS



When you want some practical hints on economy in gasket design, or when you need a gasket material made to meet current SAE-ASTM or government specs, you'll find the information you want in "Armstrong's Gasket Materials." Revised annually, this 24-page manual contains just what you want to know about designing gaskets . . . including hard-to-find data on flange and joint design. See it in Sweet's product design file or send for your free copy. Just mail

the coupon below. Be sure to specify Armstrong's Gasket Materials when you order from your gasket fabricator.

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Company

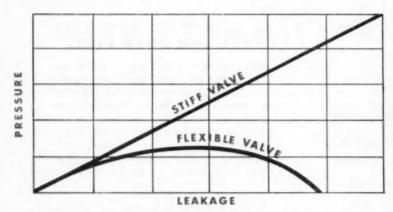
Address

The New "Long Mileage Look" in Valves

Flexible design and high strength materials can provide improved sealing, better performance, and higher mileage

The higher outputs, greater load factors, and lean mixtures encountered in modern engines are all making greater demands on valves. By utilizing high hot strength materials, valves may be designed that flex from cylinder pressure and tend to conform to a distorted cylinder seat. The result can be greatly improved sealing, maintained engine performance, and higher mileages.

Eaton engineers welcome an opportunity to discuss your valve problems with you.



Leakage Test on Distorted Cylinder Head Seat: With stiff valves, leakage increases in direct proportion to cylinder pressures.

With flexible valves, leakage is reduced to zero when cylinder pressure increase produces valve conformity.



Typical seat condition in stiff valve, caused by imperfect sealing. Result: poor performance, low mileage.



Typical flexible valve under comparable operating conditions. Result: Improved sealing assures better performance and longer mileage.

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PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

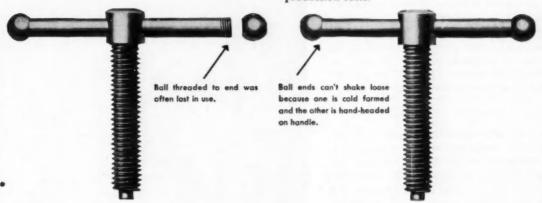
Assembly operation eliminated

The old way:

This vise handle was originally cut from bar stock by screw machine. One end of the handle was threaded while the other was machined to a ball head. To complete the assembly a separate internally threaded ball head had to be screwed onto the threaded end by hand.

The National way:

Our "Special Products Service" showed how this vise handle could be produced faster and at lower cost by cold heading. The handle and one head were cold formed to required dimensions. Then, the handle was inserted through the drilled hole in the head of the jaw adjusting screw and the other end was hand headed. Result... substantial savings in material and production costs.



Bring your "Special" problems to National

National has the experience and wide range of cold heading equipment needed to solve many "special" problems. Our "Special Products Service" representative will be glad to study your requirements. Write for free copy of National's "Special" fastener booklet.

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Fastener



Hodell Chains



Chester Hoist



Small automatic Farval system saves labor, time, lubricant in automobile engine production

FARVAL— Studies in Centralized Lubrication No. 160

LUBRICATION studies show it would take an oiler 18 minutes each cycle if he had to hand lubricate this block boring machine—with the machine shut down. But by installation of a small Farval automatic system, the lubrication job is done better in seconds—and while the machine is operating. Thus, Farval increases machine production time and eliminates the cost of a full-time oiler. In addition, Farval saves as much as 75% in lubricant used on the 24 points of this machine.

Farval is Foolproof

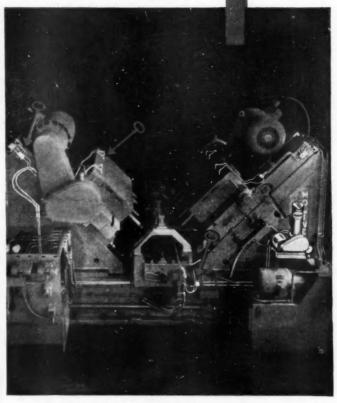
Farval manually operated and automatic systems deliver a measured amount of clean lubricant whenever needed to all bearings. The Farval Dualine valve placed at each bearing has only two moving parts—is simple, sure and foolproof, without springs, ball-checks or pinhole ports to cause trouble. A tell-tale indicator at each bearing gives positive proof that every valve has received the lubricant it needs.

Free Lubrication Survey

Let us send one of our lubrication engineers to inspect your plant equipment. Without obligation, he will present a written analysis of what Farval can do for you. Write also for free Bulletin 26 for the complete Farval story. The Farval Corporation, 3296 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.





It's only $20\frac{1}{2}$ high! Yet the Farval DC 20 automatic pumping station you see in this photograph keeps this Moline baring machine properly lubricated at all times in this automobile engine plant.

KEYS TO ADEQUATE LUBRICATION—Wherever you see the sign of Farval—the familiar central pumping station, dual lubricant lines and valve manifolds—you know a machine is being properly lubricated. Farval manually operated and automatic systems protect millions of industrial bearings.

News of the MACHINERY INDUSTRIES

By Thomas Mac New

Manufacturers of Machine Tools Offer Attractive Leasing Arrangements to Foster Use of New Equipment. Fourth European Tool Show Held

The Big Lease

One of the most significant developments emanating from the machinery industries this year, in addition to the latest in machine design, tooling, automation and automaticity, is the sponsoring of leasing arrangements to foster the use of new equipment. It is believed that the new lease plans will be of great assistance to some segments of industry in helping firms replace obsolete equipment in addition to the utilization of new installations.

Meaning to User

In addition to providing a machine tool maker with the market for tools, there will be several advantages which will accrue to the lessee. According to one manufacturer advocating lease arrangements, the user would be able to expand merchandising operations and use working capital for inventory and receivables, as well as for other equipment. Also, a lessee would more than likely be able to operate his business, by maintaining a debt-free status, without the restrictions ordinarily demanded by creditors. It has also been stated that the user would simplify the financial structure of the company's operations by avoiding a limit on future borrowing capacity and avoiding financial risk involved in borrowing. Other salient points brought out are that the user or lessee would have a wide choice of production equipment to meet changing manufacturing methods and procedures. Another factor is that the lessee does not have to pay a capital tax on the rented production equipment. Of course, the biggest argument in favor of the plan is that equipment can be obtained without substantial capital investment, thereby keeping working capital at a high level.

Plans Are Different

Basically, many manufacturers of plant and production equipment have sold machinery under bailment lease arrangements for a number of years. Of course, a typical plan of this nature calls for a down payment and then so much money per specified period of time until the equipment is paid for and legally owned by the purchaser. Under most of the new lease programs, however, the equipment user or lessee is not necessarily required to finally own the machinery. Instead, with the current planswhich are rentals-there are several options available to the machinery user. The idea which is relatively new in the industrial field has been used for some years by transportation companies to obtain new rolling

Basic Plans

One of the first such plans offered by the machine tool industry was announced by Kearney & Trecker Corp., Milwaukee, early in the year. See this column, AUTOMOTIVE INDUSTRIES, February 15. Kearney & Trecker worked on the project for approximately five years before it came out publicly with the so-called "Tool-Lease." This merchandising arrangement to obtain purchases is available in three different plans. In each of the three plans offered by the company, the lessee has the option of purchasing the equipment after a specified period of time dependent on the selected plan. All three plans run for seven years, after which the equipment is returned to the lessor for disposal. In each case, if the tool is rented for the entire seven-year period, the lessee pays about 115 per cent of the installation price. Also, in each of the three plans, the lessee has the option of returning the machine tools by terminating the agreement at any time after a specified period according to the lease plan utilized. Immediately after Kearney & Trecker publicly presented this plan to industry, several other machinery builders also came out with leasing arrangements. Some of these builders have already publicized their plans, while some are in what might be termed the experimental or research stage. Jones & Lamson Corp., Springfield, Vt., allied with CIT Corp., worked out a merchandising program which provided industry with two plans. Hardage L. Andrews, president of J&L, said very frankly that the plans were created to facilitate the expansion of productivity and markets. The basic plans provided by J&L feature a true lease arrangement running for periods up to nine years and an installment financing plan for the five-year term. The true lease or rental does not require the purchase of the equipment by the user but does require that the user place 10 per cent of the cost on deposit which will be refunded to the customer upon the fulfillment of the transaction. Four arrangements are offered with the true lease plan, the principal difference being in the annual rental and return charges. The user at any time during the rental agreement can purchase the equipment at what is mutually agreed upon as a fair market value. Since this plan is a true lease, all rental payments are fully deductible for income tax purposes, and customers get the usual one-year guarantee with a leased machine. On the installment purchase plan, a down payment of 25 per cent is required, with the remainder payable to CIT in up to 60 monthly installments. This plan is basically a bailment lease such as the type with an encumbrance recorded against title to the equipment until it is finally paid for. J&L points out that these plans will accommodate a large contingent of small and medium sized manufacturers who find it advantageous to finance investments.

Final arrangements of a plan offered by Gisholt Machine Co., Madison, Wis., have been worked out recently. Under the Gisholt arrangement, three plans are available, each
based on a seven-year lease arrangement. Each may be written either
with or without the option to purchase. The right to terminate the
agreement at the end of one, two or
three years depends solely on the plan
selected. The lease may also be written with an option to purchase at the

end of any one of these same years. According to Gisholt, several plants have already availed themselves of this new setup. The plan has been designed to cover standard machines plus the required electrical equipment. Certain accessories and all tooling must be purchased outright. Machines that must be specially designed can be leased only by special arrangements.

In the industrial truck field, Towmotor Corp., Cleveland, is offering a
choice of a three- to five-year leases
with monthly payments graduated
downward over the proposed periods
of time. The plan requires no capital
investment and is strictly of the lease
or rental type. Of course, in addition, Towmotor also offers a time
payment plan or bailment lease which
is common in the industry.

Another plan recently offered to the machinery field, but to this date not yet adopted, has been successful in the leasing of transportation equipment. With this plan, a hundred dollar service charge is added to the cost of the installation plus five per cent interest per year for five years. There is no absolute down payment involved, since it is strictly a rental program. The lessee pays the lessor 60 monthly payments and then at the termination has three options. The first is to continue month to month at a rate of \$50 per piece of equipment. Second, the lessee may purchase the equipment at 25 per cent of the salvage value; and third, the lessee may request the lessor to dispose of the equipment and receive 75 per cent of the disposal proceeds. At all times, the lessee is responsible for keeping the equipment in good condition. Also, under this plan, arrangements can be made for the lessor to purchase and lease back existing equipment which at times might result in a capital gain for the lessee. This program, like so many of the other leasing arrangements, is suited to medium-sized com-

Financing Evaluation

A statement was recently issued by an eminent financier in which he evaluated five different ways of purchasing machinery. One of the things which he stressed was that the lack of ready cash should not deter any company from buying the machinery and equipment it needs to decrease cost and increase profits.

The need is acute in many, if not most, plants today for replacement of old machinery which has outlived its usefulness and is nibbling away profits with slow production and excessive maintenance costs.

Fortunately, any sound concern interested in increasing production and decreasing operating costs can install modern, labor-saving machinery and equipment without weakening its working capital position.

Very few companies, of course, are able to draw too freely on operating funds for capital investments, so the practical answer to the problem of financing equipment is to use outside capital which can be repaid over a period of time. The proper purchasing program will make it feasible to retire the cost of the new equipment largely out of increased earning capacity.

Usually there are five ways the management of a business or industry may buy the machinery it needs.

(1) It may pay cash, (2) it can get a short-term bank loan, (3) it can make capital issues, (4) it can get limited credit from the machinery manufacturers, or (5) it can use a term-loan from an industrial financing company.

If a company has available cash reserves, it could buy the new machinery for cash. However, before converting cash into fixed assets of machinery and equipment, it might be well to make certain that such a move will not so curtail working funds that the company must forego favorable cash purchases of inventory or lose cash discounts on current bills.

As to short-term borrowing, a line of bank credit is usually most valuable for current loans on short terms, normally of 90 to 120 days. A disadvantage, of course, is that the borrower impairs his open line of credit, which should be kept for current, seasonal and unforeseen requirements.

Just as short-term bank loans have a definite place in the financing of industry, so are there certain advantages and disadvantages in the financing of capital investment, whether by bonds, debentures, preferred or common stock. Such issues are used primarily where the need is for large amounts of financing. The smaller the amount involved the higher the coupon or dividend rate will be, and the larger the underwriting commissions and expenses will be in proportion to the money obtained.

Machinery manufacturers should not be asked to act as bankers. Their terms must be fitted to their own needs rather than to the buyer's. And when purchases are made from several machinery makers, the buyer then must make payments to each separately, probably under different terms for each purchase.

Machinery makers generally prefer to leave financing to financing institutions. Few have adequate facilities to carry large amounts of instalment paper. Among the larger firms, obtaining the money which otherwise would be tied up in instalment contracts is not the most important factor in turning to outside financing agencies. The machinery manufacturers' primary need is for an experienced credit checking and collection service which can be relied upon to get results while maintaining customer good will. Few care to carry paper themselves.

The fifth financing plan, and the one devised to fill the gaps in other methods, is an equipment funding program such as these offered by the industrial financing companies.

When the buyer is ready to negotiate with the seller, he supplies the financing firm with the details of the contemplated purchase, together with the customary financial data. When the financing agency says it is prepared to finance the machinery purchases, the buyer makes his down payment to the seller and executes documents provided by the finance company. The financing agency provides funds for the balance due on the equipment and the buyer subscquently makes his payments to the financing firm each month.

Fourth European Tool Show

Approximately half a million square feet of floor space was utilized by machine tool producers from all over the world for their displays at the Fourth European Machine Tool Exhibition held in Milan, Italy, last month. One of the features of the show was that all equipment on exhibit was in operation. Although engineers and others in attendance were from practically every country, AUTO-MOTIVE INDUSTRIES' Italian correspondent states that there was a great deal of interest shown by representatives of Sweden and South America. It was also noted that there were several Russians observing the show, but the country did not exhibit its machinery products.

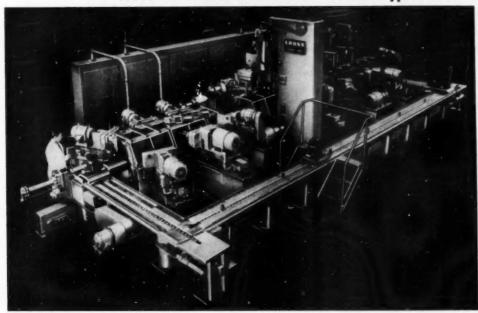
Machine tool producers from the United States demonstrated the enormous development of its machine tool industry, the wide market covered by machinery manufacturers and the most recent important improvements

(Turn to page 182, please)

EQUIPMENT PLANT - PRODUCTION

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 97

Transmission Cases Machined on Pallet Type Fixtures



A 21-station Cross Transfer-matic for transmission cases.

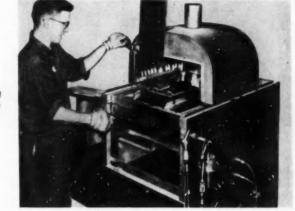
In this Transfer-matic parts are transferred from station to station on pallet type work holding fixtures. An integral conveyor returns the fixtures from the unloading to the loading stations.

The machine has 21 stations: one for loading, one for unloading, 15 for machining and four are idle. A total of 107 operations are performed, of which 84 are drilling, chamfering and reaming; eight are spotfacing and counterboring; four are boring; six are tapping; and five are inspection. The machine stops automatically if critical tools are broken or improperly set for depth.

Interchangeability of standard and special parts is provided. Other features include hardened and ground ways, built-in chip conveyors, hydraulic feed and rapid traverse, individual lead screw feed for tapping, automatic lubrication and construction to JIC standards. Cross Co.

Circle 66 on posteard for more data

Shell and Core Making Machine



The Gee shell mold and core making machine

THE Gee shell mold and core making machine is offered to the foundry industry. It is designed to use any metal pattern which will not disintegrate at the desired operating

temperature. It is said to make shells and cores simultaneously when necessary, as long as the patterns and core boxes will fit under the dump box. The shell size is controlled to



For additional information, please use postage-free reply card on page 97

the exact size of the mold. The operator can repair visible shell defects while they are on the machine.

Patterns and core boxes are fastened to a rollover frame by means of adjustable mounting rails with ordinary bolts. Stripper pins are dropped into holes drilled into the pattern plate.

Model SC-1418 accommodates any pattern up to 14 by 18 in. which requires a stripping action of up to six in. It also accommodates a core box with a base size up to 14 by 18 in., and a height of six in. above the rollover frame. The SC-2030 Model accommodates a pattern up to 20 by 30 in. with a stripping action up to six in.

Other features include air actuated stripper plate and counter-balanced pattern and dump box. Metco Processing Corp.

Circle 67 on postcard for more data

Vertical Trunnion Machine Handles Axle Housings

A automatic four-station, vertical trunnion machine for processing automobile rear axle housing with carbide cutting tools has been designed and built. Fixtures are mounted on a trunnion which is rotated upon a vertical center. The upper

upon which the trunnion assembly is mounted.

In loading, the rear axle housing is located in the work-holding fixture by means of a targeting device which is swung into position at Station 1. Various clamps and locators in the

Various clamps and locators in the

Production on the Snyder vertical trunnion machine for rear axle housings is 80 pieces an hour at 75 per cent efficiency.

bearing of this trunnion is mounted in a heavy steel plate structure supported by four corner posts.

The index drive for the trunnion is an index-and-reset mechanism driven by a Hydro motor, mounted on the upper side of the upper trunnion bearing plate. The three heads are mounted on three separate wing bases which are bolted to the central base fixture are then adjusted and locked and the targeting device is swung clear so that the trunnion may be indexed.

At Station 2, the carrier mounting flange is rough and finish faced by an actuated, scroll-type, facing head. At Station 3, ten holes around this flange are combination drilled and countersunk. At Station 4, the pilot diameter in the carrier mounting face and a clearance hole in the rear face are bored at the same time.

Carbide boring and facing tools operate at 900 sfm and high speed steel tools at 283 sfm. Feed speeds are various. Coolant is supplied from a separate tank and pump at the rear of the machine. Lubrication is from a hand-operated central system.

Clamping is manual but all subsequent operations up to unloading are automatic. It is completely electrically interlocked. Snyder Tool & Engineering Co.

Circle 68 on postcard for more data

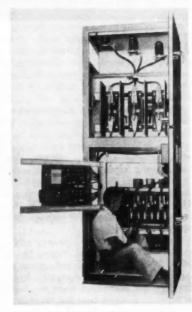
Heat Unit

Use of new metals in the construction of Platecoil, a heat transfer unit, is said to have broadened the application of this product. The unit can be made of Ampco alloy, Carpenter 20 alloy, Hastelloy B and Hastelloy C. Previously made of cold rolled steel, stainless steel and monel, Platecoils are used in heating solutions for plating, rinsing, washing and many other processes. Tranter Mfg. Co.

Circle 69 on postcard for more data

High Voltage Starter

A LINE of Air-break starters for 2200-5000 volt squirrel-cage, wound-rotor and synchronous motors is built in three styles: 50,000 kva interrupting capacity, with power



The Type ZHA Air-break contactor shown has an interrupting capacity of 50,000 kva.

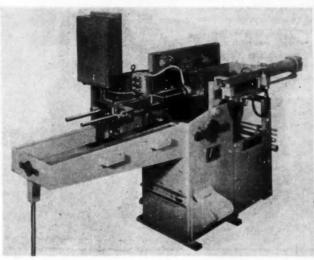
fuses for systems of 150,000 kva (2300 volt) and 250,000 kva (4600) availability, and in the volt-ampere-limitor style in which air-core reactors limit infinite kva to a finite value within the rating of the starter.

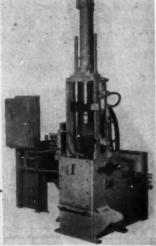
High silicon steel blow-out ears are magnetized from a single blowout coil on each pole and the arc chutes are equipped with cooling plates which remain moisture free for high efficiency to cool and extinguish the fault arc quickly.

Incorporated in the complete starter are safety door-switch on the disconnect - switch compartment, swinging overload panel, self contained bus for group installation, meters as required and cabinet-doors which may be lifted off concealed-type hinges during installation. The contactor is accessible from the front and rear of the cabinet. For reversing service, forward and reverse contactors are mechanically as well as electrically interlocked. Electric Controller & Mfg. Co.

Circle 70 on postcard for more data

Four Operations on Horizontal-Vertical Broach





With the Calonial "4" in the horizontal position, the rated capacity is six tons and the height to the center line of the broach is 44 in. The rated capacity in the vertical position is eight tons for push and pulldown broaching and for press work.

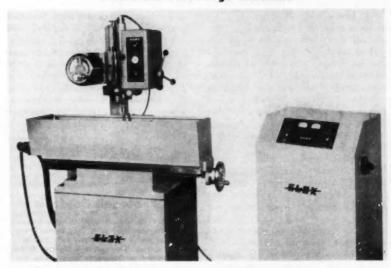
A HORIZONTAL-VERTICAL model capable of four different basic broaching or press operations is now offered to the trade. The "4" will handle push and pull-down broaching as well as press operations in the vertical position, and in the horizontal position it provides all of the well-known advantages of horizontal broaching.

This two-way broach was developed to perform both as a utility and straight production machine, for long and short run production. Horizontal and vertical positions of the working bed are assumed by pivoting the bed section about the top of the base by means of a hydraulic lift cylinder. Horizontal position, a chip pan containing the guide support is attached to the base.

Power for the lift cylinder is supplied by a hydraulic pump and motor unit mounted on a separate base that also houses the hydraulic fluid. This power unit may also be used as an auxiliary hydraulic take-off for other uses. The coolant pump and reservoir are housed in the main base. Both the base and working bed sections are weldments. Integral with the pivoting bed section is the table for supporting work-holding fixtures. In the

vertical position, the "4" requires a floor space of 84 by 40 in. and in the horizontal position requires a floor space 132 by 40 in. Colonial Broach Co.
Circle 71 on postcard for more data

Electrical Discharge Machine



The M-500 electrical discharge machine was designed in cooperation with Cincinnati Milling Machine Co. Table area is 10 by 42 in. The 9 by 15 in. insulated bolster plate is moveable over the entire area. Quill travel is 91/2 in. (Elox Corp. of Michigan)

Circle 72 on postcard for more data

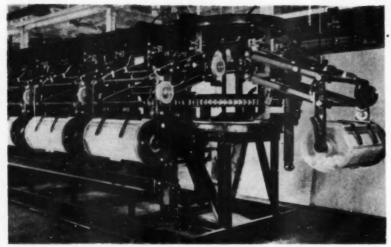


For additional information, please use postage-free reply card on page 97

Automatic Plating Barrel Conveyor

A PLATING barrel conveyor now on the market is of the return type using a standard horizontal barrel plating cylinder. Illustrated is a machine with 24 cylinders each 14 in. in diameter by 30 in. long inside dimensions, to produce 3000 to 6000 placed on both sides of the cylinders.

The machine is engineered so that none of the operating mechanism is over the tanks except vee-belt drives, which will not rust. The cylinders rotate when raising and lowering, thus greatly reducing drag-out losses



A Udylite 24 cylinder plating conveyor laid out for the normal zinc plating cycle.

lb of plated work per hour. This machine is laid out for the normal zinc plating cycle but machines are designed and built for any standard plating process. Components include Baldwin Duckworth roller chain, General Electric motors and plugging switches, Cleveland Worm Gear speed reducers, Morse Chain torque limiting clutches, Chrysler Oilite bushings and self-aligning bearings, and Allen Bradley limit switches.

The machine offers timer controlled speed and power operated skip transfers. The speed of the cylinders can be changed; as an example, cylinders in cleaning and plating can operate at one speed, and cylinders in dichromating and subsequent tanks can operate at a much lower speed. All cylinders are potentially capable of individual lowering or raising.

Cylinders of Tempron or Acrylic Resin are offered with this machine. They revolve in a trough of anodes in the plating tank, the anodes being and solution contamination. Separate chains are used for the conveyor and for the elevating. A power operated hopper, with weighing scale, is used for loading. The plated work is dried after it is unloaded from the machine. Drying is done in a drum type drier or centrifuge, or the machine is equipped with heated air operated chutes, electrically controlled. *Udylite Corp.*

Circle 73 on postcard for more data

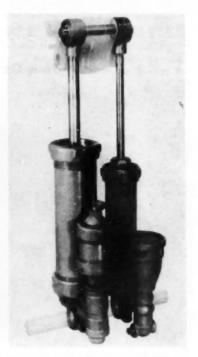
Photocell Controls

A new system of explosion-proof Condulets, consisting of a light source transmitter and a photoelectric tube receiver, now enables automation techniques to be employed at hazardous areas. The system automatically activates or turns off lights, starts or stops motors, totals assembly line output, or controls a number of other electrical or electronic devices. (Crouse-Hinds Co.)

Circle 74 on postcard for more data

Press Power Unit

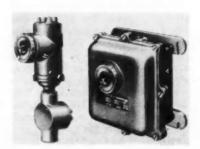
A PNEUMATIC prime mover combines faster action, damped terminal stopping, more powerful finish pressures and full reversibility in a three-



The pneumatic cylinder is at right, hydraulic cylinder for 12-to-1 finishing stroke is at left, and booster cylinder to trigger finishing stroke is in center.

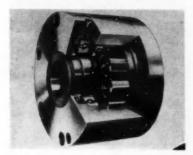
cylinder assembly. Called the Hydro-Air power unit, the device achieves its long stroke and fast operation through pneumatic - cylinder action, and its powerful closing force through the differential hydraulic-piston principle. It is driven by a small quantity of compressed air at regular plant utility pressures. Stroke is seven interminal force is either 2100 or 5600 lb, weight is 41 lb, space requirements are less than one cu ft, and the air requirement per cycle is less than 0.11 cu ft. Pantex Mfg. Co.

Circle 75 on postcard for more data



Heavy Cam Clutches

A New line of extra heavy duty ball bearing overrunning clutches for indexing backstop and general duty machinery applications is now avail-

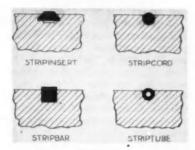


A cutaway view of the Morse Series K cam clutch.

able. Called the K Series, these clutches embody many of the design features of the former Kelpo overrunning clutches. Series K clutches have a toothed inner race driving member that actuates closely spaced independently sprung cams. Tapped holes are provided in both ends of the clutches for attaching sprockets, gears, pulleys or ratchet arms for drive requirements from 1300 to 6000 ft-lb. Desired direction of rotation is thus easily obtained by attaching the component to either side of the clutches. Four sizes are available. Morse Chain Co.

Circle 76 on postcard for more data

Core Box Sealers



Martin core box sealers of oil proof rubber.

THREE new types of rubber insert material have been announced for use as core box sealers. Formerly, one style was available and it was called Stripinsert. The three new insert styles are: Stripcord, which is a solid round strip; Striptube, a thick walled, round tube; and Stripbar, a square,

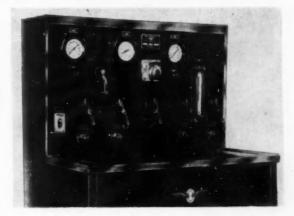
Stand Tests Hydraulic Accessories

Development of a low cost hydraulic test machine designed for general industrial and maintenance utility is announced. Known as the Stationary Hydraulic Test Machine, Model JK-100, it may be

to six gpm.

The machine features automatic temperature control of oil, accurate flow control by means of a flow control valve, and precision measurement of flow and pressure by means of ac-

Greer Model JK-100 stationary hydraulic test machine.



used in testing the performance and operating characteristics of aircraft or industrial hydraulic accessories such as valves, actuating cylinders, pressure regulators, etc., operating at pressures up to 3000 psi and flows

curate Rotometer type flow indicator and pressure gauges.

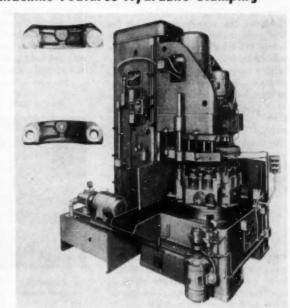
Power to drive the pump is supplied by a 15 hp, 1800 rpm, 220/440 volt motor. Greer Hydraulics, Inc.

Circle 77 on postcard for more data

Indexing Machine Features Hydraulic Clamping

Fully automatic hydraulic clamping is one of the features of this special five-station automatic indexing machine. It loads tour parts per station and has a production capacity of 670 pieces per hour at 100 per cent efficiency. It also has a special combination drilling-and-tapping head which features an independent lead-nut plate. JIC standards are followed. Multiple heads are of ball-bearing construction with shaved gears and broacher and - splined tapping spindles are of the lead-screw type with precision-ground and hard chrome-plated threads; automatic index is electrically controlled, and of the cam-and-roller d-roller type. Machine Tool

Co.)



Circle 78 on postcard for more data

solid strip. They are claimed to be ideal for sealing between blow plate and sand magazine, and also for seal-

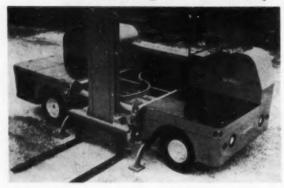
ing open-faced core boxes. Martin Engineering Co.

Circle 79 on postcard for more data

EQUIPMENT PLANT - PRODUCTION

For additional information, please use postage-free reply card on page 97

Side-Loading Truck Has Torque Drive



The Traveloader 10.000-lb side - loading
fork truck has been
redesigned with improved load distribution, better stability,
and higher tractive
effort. Features at the
T-10-A include a
torque converter drive
and springing of all
four wheels. (BakerRaulang Co.)
Circle 80 on pesteard
for more data

High Lift



The Model 19-6 Lift-A-Loft is designed for fast handling of overhead maintenance jobs up to 25 ft high. Only one man is needed to operate this unit, riding the platform to the job location, then rising up and out to the objective in less than 30 seconds. (Mitchell Maintenance Co.)

Circle 81 on postcard for more data

Materials for Etching, Tooling, Painting, Pumping

Aluminum Etchant

Oakite Composition No. 160, a granular alkaline-type aluminum etchant, is reported to provide a rapid, uniform controlled etch on aluminum, and eliminate hard sludge build-up on equipment surfaces.

Among the advantages claimed for this new material by the manufacturers are the following: It is readily soluble in water to form working solutions having long life; it offers good lutions having long life; it offers good rinsability in either cold or hot water; upkeep requirements are low; it gives off no fumes; it does not form hard sludge on tank surfaces and heating coils—the sludge created during etching operations with this material is no more than a soft slurry, which may be readily flushed down the drain when the solution is discarded. Oakite Products, Inc.

Circle 82 on postcard for more data

Liquid Floats Paints

Presto-Mat, a liquid chemical for water wash paint spray booths has been announced. It is added to the water in the tank reservoir where it combines with the paint sludge to form a floating mat. This mat is skimmed from the surface of the tank reservoir so that the spray booth curtain, nozzles and all metal parts are kept free and clean. Chamberlain-Haber Chemical Co.

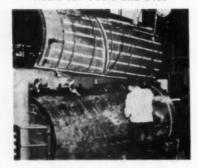
Circle 83 on postcard for more data

Plastic Coatings

Large machinery, metal structures and industrial equipment can have the corrosion-stopping and other benefits of Plastisol polyvinyl chloride coatings and linings through development of techniques and facilities for doing this work. Plastisols are said to form impenetrable barriers to chemical and electrolytic action, and the smooth, soft but tough surfaces effectively resist abrasion. Arbonite Corp.

Circle 84 on postcard for more data

Resin for Tools and Dies



A resilient tool and die material, based on Shell Chemical Corp. Epon resin, has been announced. It was developed for resilience in tools, such as drop hammer punches, and can be used to surface steel, plastics, cast iron or the special high compressive strength core material. Shrinkage during cure is as low as 0.0001 in. per inch. Excellent adhesion properties are claimed. (Kish Resin, Inc.)

Circle 85 on postcard for more data

Fiber Glass Woven Tube

Introduction of a woven fiber glass tubular sleeving which reportedly cannot be stretched under tension and will not lose its tubular shape when filled or pulled was announced recently. Available in flat widths of from one to six in. and in continuous or cut lengths according to specification, it is produced in two weave patterns, taffeta and crowfoot satin. Linton Div., Hess, Goldsmith & Co.

Circle 86 on posteard for more data

Plastic Pump Items

The complete line of Vanton Plastic products including flex-i-liner pumps, centrifugal pumps, valves, pipe and fittings, manufactured entirely of plastic, synthetic or natural rubber for resistance to most inorganic acids, alkalies, salt solutions as well as many organic chemicals is now being offered by Wagner Bros.,

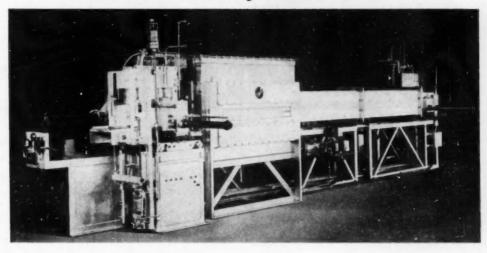
Circle 87 on postcard for more data

Finish for Polystyrene

Logoquant R-102, especially for spray application to high impact polystyrene prior to vacuum forming, is now available. It may also be used on acrylic butyrate and rigid vinyl sheet prior to vacuum forming. It is available in an unlimited range of pigmented colors. Logo, Inc.

Circle 88 on posteard for more data

Pusher Furnace for Brazing Stainless



The Harper furnace is a self-contained unit and is engineered for integration in production lines.

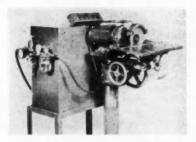
DEVELOPMENT of an automatic pusher type furnace specially designed for bright brazing stainless steel at temperatures up to 2150F was revealed recently. It is adaptable

for continuous brazing with copper or stainless steel brazing compound. It is said to maintain dry hydrogen atmosphere and a uniform heat distribution. Sequence of operations is automatically fimed and synchronized for continuous production with one-man operation. Harper Electric Furnace Corp.

Circle 89 on postcard for more data

Carbide Tool Grinder

A HIGH-VELOCITY, single-point carbide tool grinder called the HI-V operates at 10,800 rpm to combine customary rough and finish grinds into one operation. The result is a



Spindle and wheels are dynamically balanced and are mounted to the spindle with adaptor bushings which are removed with the wheel.

rate of carbide removal said to be five times greater than possible by conventional methods. Use of the ultra high speed with a nickel bond diamond wheel and a special fluid to limit energy absorption in the wheel applies approximately 95 per cent of the total energy developed to the carbide tool face. As a result, the manufacturer states, the wheel functions with a minimum of wear while permitting high-speed carbide removal.

The grinder employs an integral direct-drive motor and special precision spindle with high-speed bearings. The motor spindle provides two speeds of rotation with both right-and left-hand use. The low speed is provided for the operator's use in forming tool radii which would be difficult at the high operating velocity due to the rapid rate of stoch removal. Controls for the machine are pushbutton operated and include a master start and stop button and one for each operating speed in either direction of rotation. An electro-dynamic brake is incorporated which brings the spindle to a halt within two seconds.

Grinding fluid is applied to the wheel face by means of a Metalloid fixed-volume mist applicator incorporated as an integral part of the grinder. The vapor is applied to the wheel-work interface through an outlet in the wheel guard. The vapor, automatically applied when the machine starts, acts to limit energy absorption in the nickel bond of the wheel. Ohio Metal Working Products Co.

Circle 90 on postcard for more data

Comparator

RATREMELY sensitive dimensional and other types of measurements are said to be possible with an ionization-type transducer now under development. A glass tube about ¼ in. in diameter and one in. long is filled with inert gas at reduced pressure. When the gas is ionized by an external a-c field, two probe electrodes

in the tube furnish a phase-sensitive d-c output signal of up to hundreds of volts without amplification. Displacement sensitivity can be made more than 50,000 volts per inch. Output can be made linear or to nearly any curve, depending on tube design,



Comparator micrometer utilizing an ionization-type transducer.

type of gas and pressure, etc. The tube is relatively insensitive to the existing frequency and voltage variations of ten to 30 per cent under certain conditions.

Instruments so far announced using the T-42 transducer include a benchtype comparator micrometer (shown) with a meter that reads to ±20 microinches full scale, and measures parts up to eight in high. Decker Aviation Corp.

Circle 91 on postcard for more data

NEW PRODUCTS.

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 97



Clutch-Coupling Unit for High or Low Speeds

A clutch-coupling unit has been introduced for applications where overrunning features are required in conjunction with a flexible coupling. It is being applied most often in dual drive and alternate power applications. It makes available, within the same space limitations, two types of construction. One is specifically designed to be used for low speed overrunning applications; the other, where practically continuous high speed over-running conditions are found. Through so-called full complement construction, energized sprags grip at an infinite number of positions. The unit is reported to have the following performance characteristics: Instantaneous operation with no backlash; low unit stresses at changing contact points; torsional resilience; angular and paralleled misalignment capacity.

Circle 92 on postcard for more data



LPG Equipment for Hall-Scott Engines

Formsprag Co.

Liquid petroleum gas carburetion is now furnished as factory standard for the new Model 590 Hall-Scott truck engine. This equipment consists of a 2½-in, single downdraft type carburetor with a built-in Holly

governor, a Model M4S Converter and a 12-volt Strainer-Fuelock. It incorporates an exclusive metering valve design and precision ball bearings. Century Gas Equipment Co.

Circle 93 on postcard for more data



Coupling for Industrial Engines

Morflex flexible coupling units that attach to the flywheels of industrial engines are now available. These units are said to provide a long-life, torsionally flexible, shock-resistant, weather-proof coupling for flywheel-to-drive-shaft connection. They have a standard coupling center member consisting of two plated steel stampings riveted together and enclosing four neoprene biscuits. A balanced cast iron adapter plate is bolted to one side of the center member through the bushings of two opposite biscuits. This adapter plate is attached to the engine fly-

wheel through flywheel clutch bolt circle holes.

A standard forged steel flange is bolted to the other side of the center member through the other pair of bushings in opposite biscuits. No hole drilling or machining of flywheel is necessary; it avoids vibration resulting from misalignment and load reversal. The units require no lubrication and are claimed to be unaffected by oil, dirt, grease or water. Stock sizes for Ford and Chrysler engines are offered. Morse Chain Co.

Circle 94 on postcard for more data



Sintered Piston Ring Developed

A piston ring made from powdered iron will be offered automotive manufacturers this fall, as a potential improvement for high horsepower engines. Tests are said to indicate that tensile strength of the powdered iron ring (left) is up to 50 per cent greater than for a cast ring (right). The process is said to offer wide scope in the selection of materials for rings,

greater accuracy in grading and mixing. The natural pores in powdered metal serve as anti-scuff insurance, increasing wearability and bearing properties. A pure iron powder is screened to a controlled particle size and then hopper fed to a hydraulic press. The briquette is then sintered. Muskegon Piston Ring Co.

Circle 95 on postcard for more data

Free INFORMATION SERVICE

Postage-Free Postcards Are Provided Here for Your Convenience to Obtain FREE LITERATURE and Additional Information on NEW PRO-DUCTION AND PLANT EQUIPMENT, AND NEW PRODUCTS Described in This Issue of AUTOMOTIVE INDUSTRIES. Please Circle Code Numbers of Items in Which You Are Interested, Print Name, etc., and Mail Promptly for Quicker Service.

USE-THIS POSTCARD

FREE LITERATURE

Crank Presses

Straight side single crank presses, model S-1, are described and pictured in a new 20-page catalog just issued by E. W. Blies Co.

Four Way Valve

Just published is bulletin 307 describing and illustrating a rotary handle action or "pancake" valve. This four way valve has poppet type seals, and bottom ported base plate permits removal of body without disturbing piping. Ross Operating Valve Co.

Plating Automation

Bulletin B 50-54 on a fully automatic plating machine contains a comprehensive explanation of the parts transfer and conveying principle, details of all components such as con-trols, and other information. Automatic Plating Equipment Div., Wagner Brothers, Inc.

Diesel Lubrication

Technical bulletin B-1, "Lubrication of Diesel Engines," has been revised and updated. Generously illustrated, it discusses Diesel principles and design, types of engines in use, operat-ing cycles, engine accessories and the choice of the correct Diesel lubricants. Sun Oil Co.

Motor Pulleys

Complete redesign of the standard line of Vari-Speed motor pulleys is described in a 28-page catalog avail-able from Reeves Pulley Co.

Layout Drill

A revised and expanded catalog of the Cleereman layout drilling machine is now being distributed. This machine has applications for work which does not require tolerances closer than 6.001 in. per foot. Bryant Machinery & Engineering Co.

Cold Heading

Typical products of modern cold heading techniques, illustrated in a booklet now available, include a Diesel engine push rod, flattened ball collar stud, and round collar thumb screw. National Serow & Mfg. Co.

Dust Collector

A 24-page bulletin is offered on Uni-Wash dust collectors for foun-dries and industrial processing. Both Junior and Senior models are described with engineering data, dimensions and application photographs.

Newcomb-Detroit Co.

(Please turn page)

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Village Station

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Welding Transformer

Bulletin No. 828-10 covering a unit welding transformer-a small compact unit for portable, multiple point, package unit, and indirect series welding applications is available from Sciaky Bros., Inc.

Power Spray Washers

Sixteen - page bulletin No. 301 groups and discusses all types of power spray washers and their layouts and applications. Fifteen engineering drawings of a number of most commonly used types of washers are included. Peters-Dalton, Inc.

Cable Controls

A line of push-pull cable controls, together with a guide to selection, is offered by Arens Controls, Inc.

Packing Data

Six technical bulletins, each featuring essential data on various types of rubber and leather packings, have been issued by E. F. Houghton & Co.

Drill Unit

A four-page booklet describing their new Series 24 Automatic Drill Unit is now available through the manufacturer, the Dumore Co.

Power Products

A revised eight-page catalog (B20-53) describing the complete line of mechanical power transmission products is now available from Morse Chain Co.

Aircraft Hose 15

Publication of a 16-page catalog on its aircraft hose and hose assemblies for use in fuel, oil and hydraulic systems is announced by Resistoflez Corp.

USE THIS POSTCARD

Plastics Presses

A pictorial story of matched metal molding reinforced plastics is presented in bulletin No. 5404. specifications are also included. The Hydraulic Press Mfg. Co.

Radiator Cores

A catalog sheet now offered describes the Monofin plate type fin and round tube core. It is fully illustrated with cross-section drawings and points out leading features. Young Radiator

Presses

Detailed information covering a line of straight side double crank presses has just been published in bulletin 64-H by Niagara Machine & Tool Works.

Boosters, Accumulators 19

An eight-page catalog that describes air-hydraulic boosters and accumulators, together with complete engineering data has been released by Petch Manufacturing Co.

Polypropylene Glycols 20

A technical bulletin on the polypropylene glycols has been issued. Physical properties, specifications, and shipping data are included for the series: 150, 425, 1025, and 2025. A table of compatibilities with various materials is also given. Carbide and Carbon Chemicale Co.

Grommet Brochure

A new 16-page brochure in handy file folder form, listing sizes and types of grommets available, has just been issued by Goshen Rubber Co., Inc.

Rectifiers

Selenifiers and controls for the electro-plating and metal finishing industries are described in a 12-page catalog of American Rectifier Corp.

Anodizing Process

Details of the Alodine No. 1200 process of protecting aluminum are explained and illustrated in a bulletin just published. American Chemical Paint Co.

Rotary Table

The Model No. 2, 11-in. rotary table, which is said to be accurate to ±six seconds, is described and illustrated in an eight - page, four - color booklet. Write on letterhead to Moore Special Tool Co., Inc., 740 Union Ave., Bridgeport 7, Conn.

HERE'S PROOF: You can always count on Continental for every fastener need!

Phillips "Bits—Holders—Screws" are Exclusive with Continental!

... they can cut your production costs

Continental is the only manufacturer producing this outstanding Phillips fastening combination—bits, holders, and screws. Their development has finally made power driving really practical, even on finished parts.

They have cut fastening costs as much as 50% and Continental's HYPRO-Phillips bits average 2 to 4 times longer life than any other . . . one actually drove over 1,000,000 screws. Yes, it's another Continental exclusive in an outstanding record of 50 years in business.

Put your fastening needs in experienced hands. Call direct today or contact your local distributor. Continental can help cut your production costs.



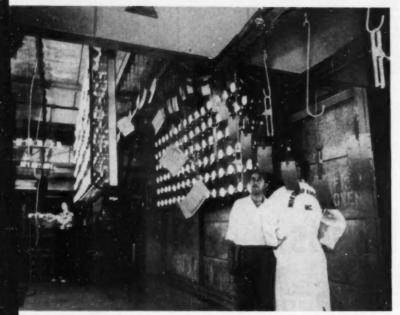
Manufacturers of **HOLTITE** Fastenings



50th Anniversary

CONTINENTAL SCREW COMPANY

New Bedford, Mass., U. S. A.



Focal point for the three conveyor lines is this latra red lamp drying area. A total of 192 heat lamps, in two banks, handle the three conveyor lines. The drying zone is 14 ft long, and is heated to 150 to 180 F by the infra red radiation. One conveyor line handles the work from the flow coater, while the other two conveyor lines run from two spray booths in the paint shop—one for color spraying and the other for zinc chromate spraying. Conveyors total 750 ft in length.

ORTHROP Aircraft, Inc., has increased production and capacity of its paint shop substantially and at the same time achieved reduction in unit costs with installation of one of the aircraft industry's first flow coating machines. A unique feature of the Northrop installation is that the flow coater is used to apply zinc chromate primer. Most flow coating installations are used to apply enamels.

A flow coater is basically a long booth-like chamber with dual banks of nozzles which spray paint parts as they progress along on a conveyor. It differs from standard spray painting in that paint is applied through the nozzles at very low pressure, providing the "flowing" effect on the parts. The flow coater at Northrop is the product of the Erikson Manufacturing Co. It measures 23 ft in length, is 11 ft, six inches high, and is eight feet two inches wide.

Northrop's production management team selected flow coating for the company's expanded painting and processing facilities when production of Scorpion F-89D and Snark B-62 components placed a heavy load on the paint shop.

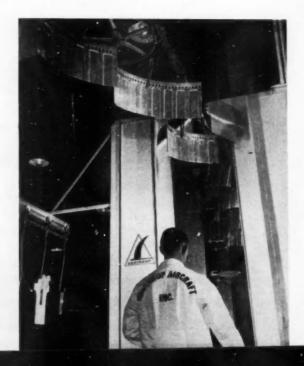
Carried by the 320 ft long conveyor line parts enter the flow coating machine. They are hung on hangers located at one foot intervals on the conveyor line. Inside the flow coater, nozzles can be seen spraying parts. Twelve nozzles are used.

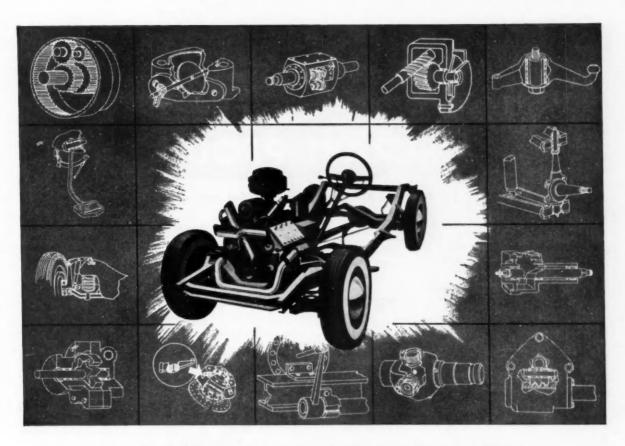
FLOW COATING Increases Capacity of Aircraft Paint Shop

Prior to installation of the flow coater, the shop had three shifts working seven days a week. Since installation of the flow coater, production has been increased by 116 per cent, with the work being accomplished on two shifts with five-day work weeks. Personnel in the shop likewise has been reduced gradually by 12 per cent as familiarization with the new equipment enabled employees to process greater volume. Expendence of the process o

cess personnel have been transferred to other assignments.

The flow coater at Northrop is handled as a threeman operation—one man to load parts on the conveyor which goes through the flow coater, one to remove (Turn to page 135, please)





TORRINGTON Needle Bearings offer the Automotive Manufacturer these advantages

- 1. High capacity
- 2. Small size
- 3. Low cost
- 4. Ease of installation
- 5. Long service life

The automotive industry was one of the first to see the unique advantages of the Torrington Needle Bearing when it was introduced nearly twenty years ago. Today, leading manufacturers of automobiles, trucks and components have standardized on the Needle Bearing to such an extent that it is in use in almost every rotating or oscillating bearing application where compactness, high capacity and ease of installation are important.

The NEEDLE BEARING has been "Performance Proved" in these Major Applications

Universal joints • Governors • Steering gear rollers Steering knuckles • Steering idlers • Power steering Suspensions • Brake camshafts • Brake and clutch linkage pivots • Clutch throw out fingers • Transmissions • Hydraulic pumps • Window lifts and many others.

If some of these applications of the Needle Bearing are new to you, why not let our Engineering Department show you how they can improve the design and performance on your product? See your Torrington Bearing representative or write direct.

THE TORRINGTON COMPANY

Torrington, Conn.

South Bend 21, Ind.

District Offices and Distributors in Principal Cities of United States and Canada

TORRINGTON NEEDLE BEARINGS

Needle . Spherical Roller . Tapered Roller . Cylindrical Roller . Ball . Needle Rollers



FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 97

Strip Nut

Tandem-type Speed Nuts are now being produced in coil or strip form with a partial shear between each



nut for fast, simple detachment. They are said to eliminate production line slowdowns due to dropped or misplaced parts. Tandem-type nuts are available in coils or strips of any desired lengths. They are designed for making power-driven attachments

with type A or B (Z) sheet metal screws. They are said to provide double-locking, vibration-free attachments. Tinnerman Products, Inc.

Circle 97 on postcard for more data

Light Alternator Drive

The development of a lightweight constant speed alternator drive for aircraft was announced recently.

The new drive, composed of ball piston hydraulic units, is a compact unit with most of the important functions enclosed in one casing. Ball piston hydraulic units are radial piston hydraulic transmissions, using precision made steel balls in the place of cylindrical pistons, connecting rods and bearings. It is, in effect, a continuously variable ratio gear box which automatically adjusts variable engine speed into the constant speed necessary to drive constant fre-

quency a-c generators for aircraft.

The permissible continuous duty rating of the new drive increases directly with the input speed. A drive delivering 15 hp (9 kva) at 4000 rpm input speed will deliver 30 hp (20 kva) continuously at 8000 rpm input speed. Drive efficiency averages approximately 80 per cent, with the weight of the unit approximately one lb per hp in 85-hp drives, and about two lb per hp in small drives.

The new drive will operate either on a seperate oil supply, or on the engine oil system. Where separate systems are used a small oil cooler is required. When operating on the engine system an extra section of the engine oil cooler is sufficient to handle the heat rejected by the drive. Production of the drives in sizes from 15 hp (9 kva) to 85 hp (60 kva) is currently planned. General Electric Co.

Circle 98 on postcard for more data

Forging Alloy Developed for Heavy Press Program

A high strength aluminum forging alloy, called X7079, is reported to offer aircraft designers aluminum forgings with greater uniformity of properties in heavy sections and a considerable increase in ductility in cross grained directions.

At present, the production of X7079, a member of the aluminum, zinc, magnesium, copper series of alloys, will be limited to forging applications for which it was developed. Attention is being directed, however, toward its possible use in other wrought aluminum products, such as heavy plates and extruded sections.

In addition, X7079 is less quench sensitive than high strength alloy 7075 (75S). Limited tests also indicate that forgings of X7079 may be less susceptible to distortion when machined than are, for example, forgings of 7075 alloy.

The advantages of X7079 are particularly apparent in die and hand forgings heat treated in sections over three in. thick. It develops higher Die Forging Properties Guaranteed

Up to Seven In. Thickness

		Guar, Ivin		Typicai		
Axis of Test Specimen		Yield Str. kai	El % in 4D	Tens. Str. kai	Yield Str. ksi	% in 4D
Parallel to forging flow lines	74	64	10.0	78	68	14.0
Other then parallel to forging flow lines	72	61	4.0	76	66	9.0

and more uniform mechanical properties than 7075 in such thicknesses.

Guaranteed mechanical properties in die and hand forgings are allowed in section thicknesses up to seven in. in the solution heat treated and artificially aged condition, X7079-T6.

The fatigue characteristics of both smooth and notched specimens of

X7079 alloy are generally similar to those of 7075 alloy. The resistance to corrosion and stress corrosion cracking of X7079 alloy are as good as or better than those of 7075 alloy.

Limited tests from X7079-T6 hand forgings up to 12 in. in thickness, heat treated in full section, show that

(Turn to page 160, please)

Hand Forging Properties Guaranteed

Up to Seven In. Thickness, Heat Treated in Full Section

	Longitudinal			Long Transverse			Short Transverse		
	Tens. Str. ksi	Vield Str. kei	El % in 4D	Tens. Str. kai	Yield Str. ksi	El % in 4D	Tens. Str. ksi	Yield Str. ksi	El % in 4D
Guar, Min	73	62	9.0	70	80	6.0	65	54	4.0
Typical	77	67	13.0	73	63	9.0	71	59	6.0



Let us tell you



20

leading engine builders use

Sealed Power
CHROME RINGS

SEALES POMER CORPORATION

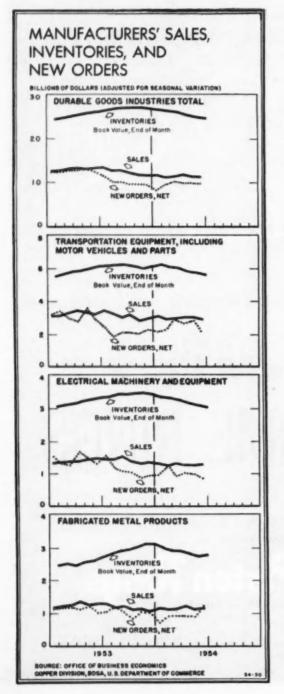
Sealed Power Piston Rings

Pull-How Spring, Fre & Pickible Oil Nay, and Grad Sreeve Incorte

Leading producer of Autoliatic Transmission Rings, Pen v Steering Rings, and New Sain Olf Rings

The BUSINESS PULSE

Improvement Which Showed Up in Retail Trade During the Spring Has Carried Over Through the Summer Months, and Fall Business Continues Good. Resumption of Earlier Decline in Business Considered Unlikely.



This Survey is prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

Faster Tempo

There are numerous signs that economic activity has quickened in tempo since Labor Day. None the less, a sense of uncertainty continues to linger on in business circles because of the fact that it is still too early to tell whether improvement has been more or less than normal for this time of year. This uncertainty is reflected in manufacturers' buying policy which remains decidedly conservative, and in Wall Street, where a good deal of caution is currently evident despite the continuing high level of security quotations. In brief no clear pattern has yet emerged this fall, and businessmen, as a consequence, are still acting with marked restraint.

Some of the information which has come to light during the past month suggests that certain of the forces which had been expected to work for expansion of business in the months ahead may not prove as strong as once seemed likely.

For one thing, it has appeared reasonable to suppose that the Government's policy of retrenchment might be slowed appreciably during the present fiscal year (fiscal 1955) in view of the fact that reductions in outlay during the fiscal year which ended last June 30 were carried considerably further than the Administration had originally thought possible. But in September the Treasury issued revised budget estimates for the present fiscal year which indicate that the Administration's economy drive may well continue at full steam.

Government Spending

Spending in this fiscal year, on the basis of present programs, is now estimated at about \$64 billion, \$1.6 billion lower than was forecast in the budget message last January. There appears to be strong likelihood, moreover, that spending will actually be reduced below the revised estimate. This is because the revenue estimate for fiscal 1955 has been revised downward even more than the spending figure. As a result, a deficit of \$4.7 billion is now forecast, whereas last January the prospective deficit had been placed at only \$2.9 (Turn to page 174, please)



LORD *Houshes Horsepower*....

THE new Lord Dynaflex Suspension, now being introduced on leading 1955 Model Outboard Motors, at last quiets the operation of powerful outboards. Ordinary conversation now can be heard easily. What's more, the Lord Dynaflex Suspension so completely eliminates vibration that uncomfortable "boat shake" is simply not there. Lord Engineers have worked closely with outboard motor designers, applying principles similar to those used in Lord Mounting Systems which pillow the huge engines in all modern airliners. Here again is proof that Lord Engineering controls Vibration . . . Anywhere.

dynaflex suspension

DETROIT 2, MICHIGAN 311 Curtis Building 105 ANGELES 28, CALIFORNIA 7046 Hollywood Blvd. CHICAGO 11, ILLINOIS 520 N. Michigan Ave. CLEVELAND 15, OHIO 811 Hanna Building

PHILADELPHIA 7, PENNSYLVANIA 725 Widener Building

NEW YORK 29, NEW YORK 630 Fifth Avenue Rockefeller Center BALLAS, TEXAS 313 Fidelity Union Life Building SAYTON 2, OHIS 410 West First Street

Over 27,000 designs and their variations from which to choose.





AIRBRIEFS

By ROBERT McLARREN

Flying Boat Future

In this atomic age it has been supposed that the slow, lumbering flying boat had joined the dirigible and the catapult-launched floatplane as outmoded flying weapons. The Glenn L. Martin Co.'s new XP6M-1 Seamaster is expected to be the answer to critics of the flying boat. The swept-wing monster is understood to have a gross weight of 100 tons yet have a top speed of 600 mph. Powered by four Wright J67 turbojet engines of 10,000 lb thrust each, the new craft features a long, extra-slim hull and variable-incidence wing and tail for quick takeoffs and high speed in flight. It has a 100-ft span and is 140 ft long. Now nearing completion, the prototype of the "new age" in flying boat design is scheduled to fly early next year. It will be offered commercially.

No U.S. Midgets

The British Folland "Midge," lightweight jet fighter, has excited European interest on the score that five of them can be built for the cost of one current jet fighter. The tiny single-seat, swept-wing fighter has a span of only 21 ft and weighs only 5000 lb. The company argues, with considerable logic, that the "Midge" is not to be compared directly with a current jet fighter, such as the North American Sabre or the Hawker Hunter. Instead, they argue, the comparison must be between the fighting ability of five Midges and one Sabre. Conceding the argument, however, U. S. Air Force planners point out that the lightweight fighter offers great promise as a shortrange, fast-climbing interceptor for England and European countries but little, if any, value for the defense of the United States, whose strategic borders are several times the length of all of Europe, let alone a single European country. The U.S. fighter must be long-ranging, extremely high-flying and capable of supersonic speed, attributes impossible of attainment in a lightweight fighter-or even five of them.

Throw-away Plugs

The leading aircraft spark plug manufacturers have been arguing for years that their product could well be used only once and then discarded—at a saving. Naturally, there are qualifications and the Air Force has finally set about determining what they are. The service has had available, for years, precise cost data on replacement rates, manhours of time for removal and re-installation and for plug overhaul and reconditioning. Overlooked, say the manufacturers, is the economic fact that if the service approved such a practice, the plugs themselves could be designed and manufactured far more simple and less expensive to buy in the first place. The Air Force is now examining the whole range of possibilities of such a procedure.

How Much the Air Force?

U. S. Air Force statisticians, after a two-year study, have concluded that its total assets amount to about \$75 billion, or many, many times that of any single U. S. enterprise. But the incredibly high rate of obsolescence of its assets forces the service to spend about 10 per cent of this valuation annually just to keep it up-to-date. USAF says that its combat wings are now 61 per cent "modern" and that the entire 137-wing force will not be modern until July, 1957—more than $2\frac{1}{2}$ years from now. "Modern" is not precisely defined and varies with the type of aircraft: fighters remain first line for only about two years whereas transports are listed as modern for as long as five years.

Jet-Piston See-Saw

Despite the attainments of the Boeing Stratotanker, awarded a production contract by the military, the piston-engine transport refuses to concede the airline battle. Lockheed's new Navy R7V-2, a Super Constellation powered by four Pratt & Whitney T34 turboprop engines of 5500 hp each, has a cruising speed of 440 mph, according to company officials. Despite the 500-mph cruising speed of the swept-wing Boeing jet. the difference amounts to only 45 minon a coast-tocoast airline schedule. The big, new Lockheed can carry a 16-ton load on a transcontinental flight of less than six hours and a 10-ton load over a 3000-mi trip. Douglas' new DC-7C "Seven Seas" transport will carry a 25-ton load for 5000 miles (New York to Rome, Tokyo to Seattle, etc.), something no jet transport now flying can accomplish, nor is it likely to for many years.

(Turn to page 196, please)



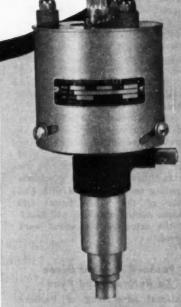
Synchro-Start has re-designed its line of SPEED SEN-SITIVE CONTROLS in one, two and three switch units so that they will give still longer life, better accuracy and be more economical to build.

These speed sensitive switches are available in two body designs. The GS series is adaptable to standard distributor take-off to accommodate gear or coupling drives and the rotating parts run in oilless bronze bushings. The GH body design is for standard SAE tachometer drive and runs in oil sealed ball bearings, lubricated for life.

These units contain three snap action switches rated 10 Amps.-110 Volts A. C. activating three individually adjustable switches to make or break a circuit at any RPM. All three switches are activated at any desired speed and can be had with adjustable automatic re-set of manual switch.

The models shown here automatically perform three different speed sensitive operations at any desired RPM.

Write us for the correct model for your installation.



Model G5-3

Synchro-Start Products Inc. Mfrs. of Automatic Engine Controls Since 1932



SKOKIE, ILLINOIS

TEWS of the AUTOMOTIVE AND AVIATION INDUSTRIES

Continued from Page 39

Ramo-Wooldridge Expands Missile Research Work

Announcement by Thompson Products, Inc., that the company has initiated a major new guided missile program points up the ever-growing responsibilities that automotive companies are assuming in the country's defense activities. Already playing a vital part in guided missile research and development, Thompson's affiliate, Ramo-Wooldridge Corp., Los Angeles, expects to spend \$9 million during the coming year on its new program.

The Ramo-Wooldridge building program will provide the division with laboratory and office facilities taking up approximately 100,000 sq ft of space by mid-1955. A feature of the new facilities will be an electronic computing center equipped with \$1.5 million of the latest digital and analogue computers which will fabilitate the extensive theoretical work required.

Packard Account Given To Ruthrauf and Ryan

National advertising of Packard cars has been turned over to the Ruthrauf and Ryan agency, which has headquarters in Detroit. The agency



FAST AND SLOW MOTION IN ONE PLANE

The Custer Channel Wing-5, unique airplane with scoopshaped wings, recently flew over a western airport at 11 mph. It is claimed that the plane's design will lower landing speeds to sate limits while still giving future aircraft a lift and air speed equivalent to cargo and passenger-carrying aircraft. Flying speed of the 2½-ton prototype CCW-5 is in the 200 mph range. Twin pusher-type propellers on the trailing edge of the wings suck air across the half-carrel-shaped wing scoops to provide a vacuum above the wings which lifts the plane.

succeeds Maxon, Inc., which has handled the Packard account for three years. The new agency will also offer merchandising and dealer service.

Mack, IH Spike Talks of Merger

Mack Trucks, Inc., and International Harvester Co. have denied reports that the latter is seeking to purchase Mack. The rumors cropped up following the collapse of talks between Mack and White Motor Co. on the possible acquisition by White of the former.

Chrysler of Canada Hopes to Hike Output

With a \$41 million expansion program near completion, Chrysler Corp. of Canada has high hopes of increasing its output to the point where two shifts might be required. Like its parent company in the United States, the Canadian company is also seeking to regain a larger chunk of the market in that country. The Canadian corporation now has the potential to double car output, if necessary.

(Turn to page 198, please)

THREE SECTIONS ONLY INDICATE GAIN IN SEVEN MONTHS OVER 1953 PERIOD Regional Sales of New Passenger Cars

Zone	Region	July 1954	June 1954	July 1953	Saven Months		Per Cent Change		
							July over	July over	Seven Months
					1954	1963	June	July 1953	1954 ever 1953
1 2 3 4 6 7 8	New England Middle Atlantic South Atlantic East North Central East South Central West North Central West North Central Wost South Central Mountain Pacific Leastion Not Determinable	29,948 93,427 86,567 115,767 20,750 47,774 48,390 14,415 47,290	37,216 116,782 68,190 186,504 29,291 55,330 99,469 17,783 85,347	31,106 100,534 56,553 137,013 25,279 55,606 40,153 17,381 49,768	203,778 641,336 388,719 840,783 161,157 325,803 316,783 97,404 316,626 1,837	198,812 653,665 386,205 897,480 100,167 340,844 309,077 111,940 355,628	-19, 53 -19, 99 -10, 51 -26, 03 -29, 16 -13, 68 -16, 95 -10, 94 -14, 50	- 3.74 -14.71 - 5.63 -15.51 -17.92 -14.16 + .48 -17.08 - 5.00	+ 2.50 - 1.88 13 - 6.33 + .62 - 4.41 + 2.48 -12.90 -10.97
		******	-	124541.	1,007	53138	1111111	******	100000
	TotalUnited States	474,316	596.753	833,783	3,291,118	3,413,808	-20.52	-11.14	- 3.59

States comprising the various regions are:—Zone 1; Conn., Me., Mass., N. H., R. I.,

Vs.—Zone 2; N. J., N. Y. Pa.—Zone 3; Del. D. of C., Fla., Ga., Md., N. C., S. C.,

Zone 8; Iowa, Kan., Minn., Mo., Neb., N. D., S. D.—Zone 7; Ark., La., Okia., Tex.—Vas.—Zone 4; Il., Ind., Mich., Ohie., Via.—Zone 5; Id., Kv., Minn., Texn.—Zone 6; Il., Ind., Mich., N. D., S. D.—Zone 9; Cal., Ore., Wash.

Vs.—Zone 4; Il., N., Y., Pa.—Zone 5; Ark., La., Okia., Mass., N. H., R. I.,

Zone 8; Iowa, Kan., Minn., Mo., Neb., N. D., S. D.—Zone 7; Ark., La., Okia., Texn.—Zone 6; Il., Ind., Mich., N. D., S. D.—Zone 7; Ark., La., Okia., Texn.—Zone 6; Il., Ind., Mich., N. D., S. D.—Zone 7; Ark., La., Okia., Texn.—Zone 6; Iowa, Kan., Minn., Mo., Neb., N. D., S. D.—Zone 7; Ark., La., Okia., Texn.—Zone 8; Aris., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.—Zone 9; Cal., Ore., Wash.

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All Johnson Universal Bronze Bars 13" length.

hether stock Johnson Bearings and Bars... or bronze castings, rough or machined... our large facilities make possible immediate delivery. We are equipped to produce castings up to 18" OD and 20" length, in a wide range of alloys. Over 920 stock sizes of General Purpose (GP) Bearings and over 400 sizes of Universal Bronze Bars are available from stock through Johnson distributors. Write for catalog on these items ... or send inquiries on special castings and bearings.

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JOHNSON BEARINGS
SLEEVE HEADQUARTERS
SINCE 1901

COORDINATION—Key to Successful

Volume

. . Continued from page 57

Manufacturing

story is in the transfer machines and other automatic metal cutting equipment. The story is too huge to summarize here but fortunately it has been told in a stream of articles in Automotive Industries for the last 12 years or more.

We have also covered allied processes—welding, heat treating, electroplating, induction heating and hardening, transfer presses, forging presses, electrostatic painting, and many other techniques too numerous to mention.

Automation, however, is a subject that deserves special attention despite the coverage it has been given in this publication. Automation goes to the root of modern manufacturing practice more than any other technique. In its simplest form it implies the complete mechanization of an individual automatic machine by the introduction of means for automatic loading and unloading. In the ultimate it comprehends the automatic factory; intermediate are the numerous examples now on the record of long lines or entire departments linked with automation from start to

Thus automation may be a part of a single machine, or the link for an entire process line. In its latest con-

now there are 12

leading manufacturers of autos, trucks and tractors

who





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Each year more of the biggest names in the American Automobile Industry are switching to Dole
Thermostats for more accurate control of cooling systems.
Dole Thermostats are specially engineered for modern high compression engines and pressure cooling systems. Specify Dole with confidence and help assure a smooth running motor.



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ception it takes in all methods of mechanical handling—conveyors and industrial trucks and hoists and cranes—is intimately linked with the production process. It must be if the manufacturer is to face the competition of today.

Automation and transfer machines have added to the problems of advance planning on the part of engineering and manufacturing. When a large investment is made in an automatic line, say for a cylinder block or a cylinder head, engineering must plan some years ahead with an engine design that should not change sufficiently for perhaps five years to obsolete the initial equipment. Up to recently, this was assumed to be a hard and fast rule. Then at the SAE National Production Meeting, E. N. Cole, Chevrolet chief engineer, took issue with this concept of frozen design, averred that between production men and machine tool builders some way must be found to provide greater flexibility of action.

Nevertheless, since transfer machines of moderate size run around \$250,000 to \$500,000 engineers must plan ahead, must make sure that the design of tomorrow can be built on the same equipment without too much

SOUTCE FOR STEEL CASTINGS



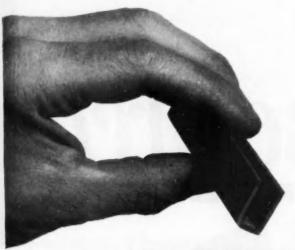
Get the booklet that tells the whole "ONE SOURCE" story!

A new Campbell, Wyant and Cannon booklet "One Source" contains latest information on many types of castings: steel, gray iron, intricate, general purpose, those with special properties, heat-treated, and centrifugal. The pages illustrated above (for example) tell how the triplex process is combined with expert core making, molding and heat-treating facilities to enable CWC to produce over 150 tons of high quality steel castings a day . . . in any quantity, at a price and quality to meet your most critical demands. The book also tells how CWC one-source responsibility provides better, faster service, more dependable delivery. Without a doubt you'll want to read this book now, then use it often as a handy reference. Don't delay.

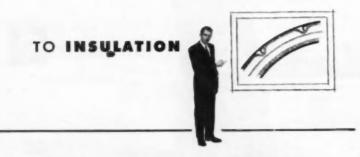
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For a good slip-fit without rattling or looseness, Felters Felt is an ideal design material. To insulate against heat or cold, there are grades of Felters Felt to solve many knotty problems.

If you would like information about felt's versatility in solving design problems, write to Felters. Our 16-page "Felt Design Book" describes many interesting problems that have been successfully solved by Felters Felt. Write for your free copy. THE FELTERS CO., 253 South St., Boston 11, Mass.

PELTERS S.A.E. FELTS F-10, F-11 & F-13

are often used for oil or grease retention where the felt is com pressed or confined in an assembly. Where operating conditions are not too severe, these grades are also used to make dust

Felters Felt produced for specific applications.

These are 3 of many grades of

FELTERS FELT



change later in tooling or in heads.

Here and there, at regular intervals there emerges a unique process that can easily affect manufacturing from its very inception. Surface broaching is an early example. The automation of crankshaft turning equipment, the automation of Lo-Swing camshaft lathes, Lodge & Shipley Flo-Turn, the automation of Gisholt crankshaft balancing machines -these are more recent examples of turning points in progress. Only a few months ago, Michigan Tool Co. announced its Roto-Flo process for producing by rolling such external shapes as splines, serrations, oil grooves, etc. Many times faster than conventional methods, this technique may well revolutionize practice in its field.

Nothing is more important today than quality control. Statistical control methods are being exploited to the full in many leading plants. No scientific device as a watchdog of one today can ignore the role of this quality and its uncanny ability to predict trouble before it occurs.

As an adjunct to quality control the field abounds in automatic and leectronic inspection devices capable of inspecting and sorting parts at high speed without supervision. These new tools are capable of amazing accuracy-they can gage parts to the millionth of an inch if required. In addition, there are the various kinds of non-destructive inspection methods -magnetic particle inspection, X-Ray, ultrasonic devices, etc. All of these techniques are esential in supplementing modern methods, particularly where automation is employed.

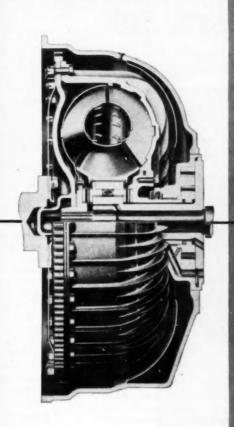
Our object in making the foregoing high-spotting of developments in materials and methods is to show the setting for the complex of variables facing both designers and production men. Many must be arbitrarily discarded because of local considerations such as small volume or job lot production; but none can be dismissed without careful consideration. These things impose a major responsibility upon management. Management will have to decide when and how much it can afford to spend on new and advanced equipment. Decisions cannot be made lightly since competition armed with better methods can take the lead in sales.

In the competitive battle of today, each organization must have people with imagination and technical skill capable of appraising all of the new developments in materials and methods and equipment. And wise management must be prepared to invest in the opportunities they uncover.



TORQUE CONVERTER

used in Fordomatic and Merc-O-Matic transmissions



An air-cooled Torque Converter of unique design with steel blades assembled in die-cast aluminum Impeller whose 68 fins provide swift cooling.

The Turbice is made of steel stampings and the Stator is aluminum. Its One-Way 20 sprag clutch is Borg-Warner's well-proved design.

Light in weight, with a torque ratio of 2.1:1, it has excellent efficiency, yet it can be readily disassembled in the field for inspection or repair.



BORG - WARNER CORPORATION

Chicago 38, Minels





Studebaker Higher Hp V-8

(Continued from page 60)

changed radically to promote better cooling and freedom from vapor lock. Whereas the fuel pump originally was mounted overhead, it is now lowered to camshaft level and is mounted in front to take advantage of direct fan cooling.

On the President engine, in particular, an oil bath air cleaner and silencer is specified to assure proper silencing. Generally speaking, the other details of the engines—water cooling and pump, lubrication system, ignition system, etc., remain the same as on last year's V-8.

The Champion engine, on the other hand, was given different treatment to attain an increase in rating and displacement. Here the basic engine remains substantially the same except for an increase in stroke which requires a new crankshaft. In designing a new crankshaft, however, it was found expedient to increase main bearing journal diameters to 31/16-in. as compared with the former 2½ in. diameter.

Connecting rods and big end bearings remain the same and are interchangeable with the previous engine. Although the pistons are of the same diameter as before they differ in detail.

A distinctive feature of the new engine is an improved combustion chamber said to reduce explosion pressure shock, thereby effecting quieter and smoother operation free from combustion roughness.

The President transmission boasts quieter gearing and other improvements designed to reduce noise. One of its major features is an improved valving system, said to offer the following advantages: increased converter pressure to reduce cavitation and noise; provision for smoother shifts; an additional valve to apply both forward and low bands to pick up first gear when starting. The latter is one of the elements accounting for increased capacity. Added capacity in the front direct drive clutch and minor changes in the torque converter also aid in stepping up capacity.

Clutches on President and Champion models are larger, will provide more even starting and longer life. Brake pedals on automatic drive cars are of new design supported by one rod instead of two. The brake pedal pad is smaller than on previous automatic drive cars but larger than standard '55 pedals. Hill Holder is standard equipment on Commander and President models.

President brakes are the same '54 Commander brakes, except for a thicker lining on the Wagner front secondary shoes to provide longer life. Power brakes are available on special order for all models, the pedal pad being the same as on automatic drive but mounted lower, about four-in, above the floor board.

Rear axle on Champion and Commander models is the same as in '54 Champions. The '54 Commander axle is used on the President and Commander station wagons.

Ross variable ratio steering is used on Commander and President; Saginaw on Champion.

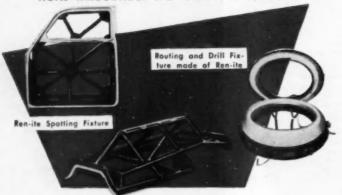
Ignition key starting is on all models. Vinyl-covered wiring harness is used throughout. President models are equipped with deluxe horns having three-tone harmony.

(Turn to page 127, please)

SAVE Tooling TIME_70% Tooling COSTS_50%

The First Dimensionally Stable Tooling Plastic for

- STRETCH PRESS, HYDROFORM AND DROP HAMMER DIES
- MASTER CONTOUR BLOCKS
- CHECKING FIXTURES
- DRILL AND ROUTER FIXTURES AND MANY OTHER APPLICA-TIONS THROUGHOUT THE TOOLING INDUSTRY



Canopy Opening Checking Fixture, showing the use of Ren-ite Plastic stock tubing

REN-ITE is a modified Epoxy thermosetting resin for use as a laminating plastic without application of heat or pressure for general tooling applications. Cured, non-toxic, non-corrosive, easy to patch, not brittle, bonds to any material. Packaged in premeasured cans, complete with resin and hardener for immediate convenient use. We invite you to try Ren-ite products in your tooling program. Write for further information and price schedules on complete Ren-ite line.

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A Mechanical Eye to Watch Your Tools

Cross Machine Control Units Reduce Downtime and Tool Costs



(U.S. Patent Nos. 2679038 and D-163935. Others Pending.)

The Machine Control Unit was originated by Cross to solve tool changing and downtime problems in machines with multiple tooling.

Available for drilling, milling, boring, turning and similar machines, the Control Unit provides many benefits:

- ★ It reduces tool expense by minimizing breakage and grinding.
- It is equipped with Toolometers which automatically stop the machine when tools need changing.
- ★ Other tools indicated by the Toolometers as almost used up are replaced at the same time. This grouping of changes drastically reduces downtime.
- Pre-set tools are stored in the Machine Control Unit for instant availability at the machine.
- ★ Standard fixtures and gages are provided for pre-setting the tools to eliminate downtime for machine adjustments and trial cuts.

Over 300 Cross Machine Control Units are now successfully reducing manufacturing costs in plants throughout the country. It will pay you to write, wire or phone for full information today.



Master tool setting fixtures and two standard types of gages for pre-setting tools.

Established 1898

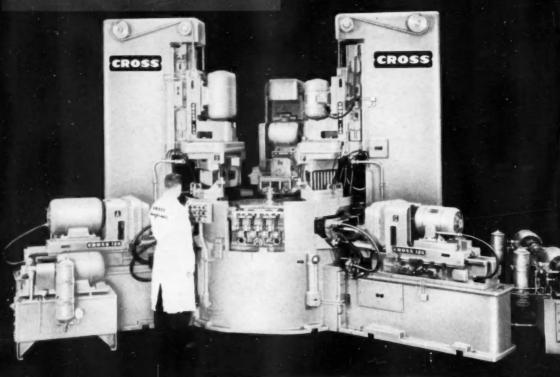
THE

CO

Special MACHINE TOOLS

Drills, Reams, Chamfers, and Mills Connecting Rods

Another Special by Cross



- * 450 pieces per hour at 100% efficiency.
- ★ 6 stations: 1 for loading, 2 for drilling, 1 for chamfering, 1 for milling, and 1 for reaming.
- Drills, reams and chamfers bolt holes; drills, reams and chamfers piston pin hole; and mills lock slot.
- * Fluid motor driven index table.
- Hydraulic power clamping for work holding fixtures.
- Other features: Hardened and ground ways; coolant system; hydraulic feed and rapid traverse; construction to J.I.C. standards.

Established 1898

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Special MACHINE TOOLS



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WEAN COMBINATION SLITTING AND SHEARING LINE REDUCES PRODUCTION COSTS FOR LYON METAL PRODUCTS

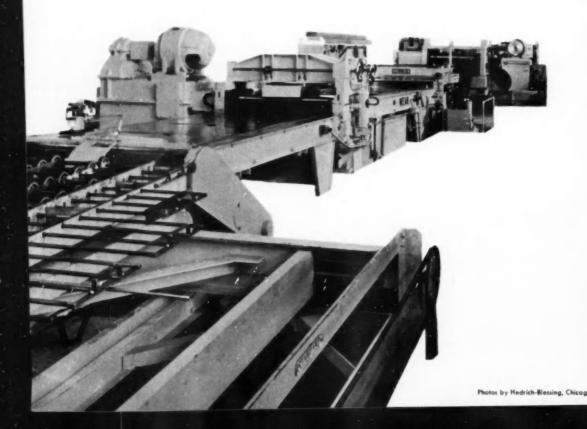


J. B. O'Connor

"We've noted savings made in raw material inventory; greater flexibility of inventory and improved service in our fabricating departments..."

To combat rising costs and meet increasing competition leading manufacturers in every field are giving modern production machinery a thorough going over.

Such was the case at Lyon Metal Products, Aurora, Illinois and York, Pa., one of the nations leading producers of sheet steel products. Months ago Lyon officials began to position themselves for the competition they knew to be inevitable. They reviewed their entire operation — studied every possible means of increasing production while curbing costs.



That's where Wean Equipment came into the picture. Wean knew their high production Slitting and Shearing Line was a natural for people like Lyon. They showed Lyon the sizable savings possible by buying coil stock directly from the mill, slitting and shearing to width and length desired. Lyon officials checked other Wean lines at work, cutting to resquared tolerances at 100 cuts or 200 feet-per-minute. Wean Equipment engineers pointed out the fact the users of this equipment required less warehousing, less stock control, that users paid less for their steel, had greater flexibility of their entire operation.

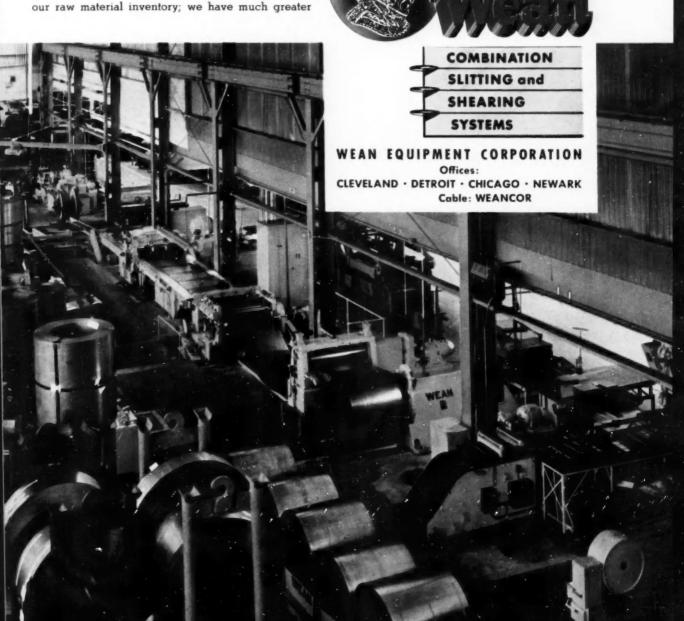
Lyon officials listened, compared figures, checked their costs and gave Wean the green light. Recently J. B. O'Connor, an official of Lyon Metal Products checked over the first three months Wean operation. He made the statement:

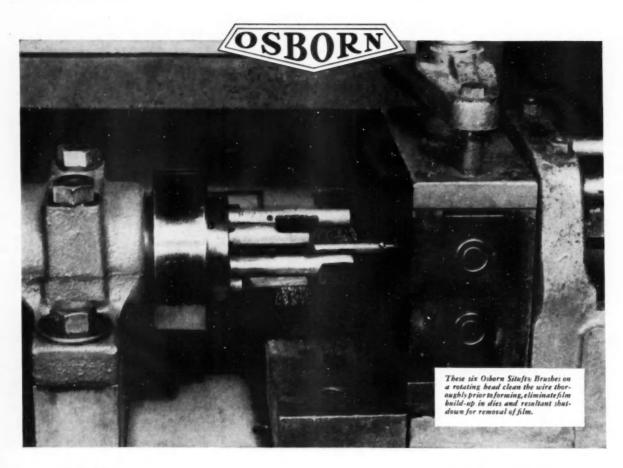
"We made a sizable saving in floor space, we accomplished a very much worthwhile reduction in our raw material inventory; we have much greater

flexibility in that raw material inventory and perhaps more important, we are giving all of our fabricating departments a much improved service. We have every reason to believe that this will amortize itself in relation to expected returns on money invested."

If you're in the business of manufacturing products requiring various widths and lengths of steel, like Lyon, it will pay you to talk with Wean Equipment — once you get the entire story we're sure you'll agree the savings possible, even for smaller users, make the Wean Line one of the best investments in modern metal working equipment.

FORIPMENT CORPORATION





Eliminates downtime

HOW CAN YOU SAVE WITH AN OBA?





THE spade weld screws shown here are made from wire. The problem was to clean the wire prior to forming screws. Former cleaning method caused frequent lengthy shutdowns of press for removal of film build-up in dies. Now, the Osborn Power Brushing setup shown cleans the wire thoroughly, eliminates costly downtime.

Your nearby Osborn Brushing Specialist is constantly helping to make savings like this by studying the cleaning and finishing operations in all kinds of plants and giving a written report with recommendations for improvements. Why not have him make this Osborn Brushing Analysis in your plant? There is no obligation. Call or write The Osborn Manufacturing Company, Dept. E-22, 5401 Hamilton Ave., Cleveland 14, Ohio.

Osborn Brushing Analysis

TO HELP YOU DISCOVER HIGHER QUALITY AND LOWER COSTS WITH POWER BRUSHING

STAINLESS STEEL FOR KITCHENS

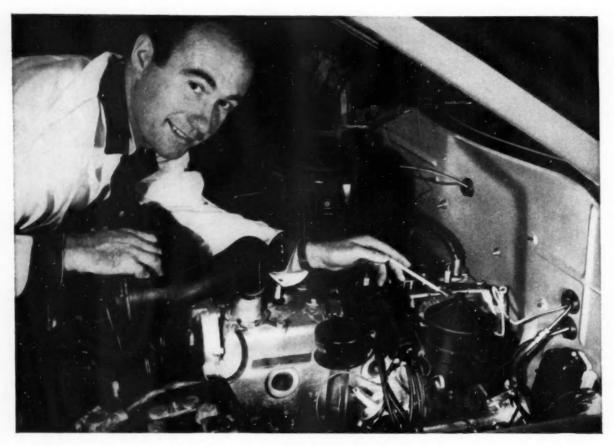
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High quality stainless sheet and strip steel . . . for the product you make today and the product you plan for tomorrow.

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Manufacturers of Stainless and Carbon Steels



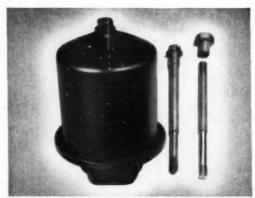
Here's where Purolator screened out rising costs

 Purolator makes oil filters for a prominent auto maker. They're top-notch filters that do a tough job well. Purolator and the car manufacturer are both proud of them.

Not long ago an RB&W "fastener engineer" got loose in the Purolator plant—just when company production executives were looking for a way to lick rising costs. He noticed that the Purolator filter was being assembled with a two-piece fastener made slowly and laboriously on a screw machine.

Our man told the Purolator people about RB&W's batteries of cold-forming machines. Purolator wanted to know more. Now their filter is assembled with a one-piece RB&W fastener that costs far less to make and assemble.

Chances are you can find a stage in your operations where RB&W" fastener engineering" can help you keep costs in line. As a leading manufacturer of all kinds of fasteners, we're always able to recommend and supply the right ones for all your needs. Write RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY, Port Chester, N. Y.



EASIER, FASTER ASSEMBLY undercut high costs when Purolator switched from a two-piece fastener (right) to an RB&W-designed cold-formed fastener (left) for its famous oil filter.



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Plants at: PORT CHESTER, N. Y., CORAOPOLIS, PA., ROCK FALLS, ILL., LOS ANGELES, CALIF. Additional sales offices at: PHILADELPHIA, PITTSBURGH, DETROIT, CHICAGO, DALLAS, SAN FRANCISCO. Sales agents at: PORTLAND, SEATTLE. Distributors from coast to coast.

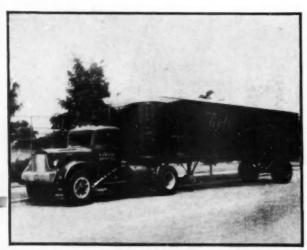


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Keeping downtime to a minimum is a must for heavy duty truckers. That's why so many choose Lipe Clutches.

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NO SHOCK! NO GRAB! NO COCKED PLATES!

LIPE MULTI-LEVER CLUTCH

The Lipe multi-lever Clutch gives more engagements between teardowns. There's no grab, no shock. Strain on engine and drive-line is reduced, tire mileage increased.

Here's the reason: There's only one spring. Spring pressure is distributed uniformly around the full 360° perimeter of the pressure plate by 20 pressure-equalizing levers. Every part of the pressure plate touches at the Same Instant . . . with the Same Pressure. There's no cocking of the plate. No areas of high-speed slippage and localized burning. Circulated air keeps internal temperatures low. The clutch engages smoothly . . . requires no babying . . . holds without slippage in final engagement . . . disengages with light pedal pressure.



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Sound design — first Good appearance always

New A.E.F. Edge Trimmer designed to obtain uniform widths of steal strip prior to entering the A.E.F. Tobe Mill.

Studebaker V-8

(Continued from page 114)

Electric windshield wipers are standard on President, extra cost on Commander. Champion models are equipped with vacuum operated windshield wipers. All instrument panels are new and basically alike on all models

The new pressure type radiator caps hold 12-psi pressure and are of atmospheric vented type. In combination with a redesigned dome-shaped reserve tank radiator, the new cooling systems are adapted for higher operating pressures, provide for higher boiling point of the coolant.

Exhaust pipes are 1%-in. on Champion; 2-in. on all V-8's.

Exterior styling is new, although the bodies remain basically unchanged. There is a new hood and grille on all models, lending a complete family resemblance. Hood ornaments, too, are of the same design. Tail lights are of more rounded form with the lens projecting farther for easier visibility. On sedans the tail lights are more massive, overlapping the fenders on the side.

An exterior stainless steel visor is fitted on Regal and State sedans and station wagons (except Ambulets).

Interiors are new with many special features on the President. Gold plated hardware is a feature of President and State sedans, trim plates behind door hardware on these models being of Mylar, a gold-plated plastic. The lower section of the instrument panel on these models is gold finished while the radio grill is gold with a chrome frame. Sponge rubber vinyl covered crash pads on the instrument panel of these models match the interior garnish molding colors. These pads are available, in the four basic interior colors, on other models at extra cost.

President models are fitted with fiber glass roof insulation as added protection against heat and noise. Fiber glass is used as hood insulation on all models.

AUTOMOTIVE INDUSTRIES . . .

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Incorporating Human Engineering in Aircraft Design

(Continued from page 61)

The physical make-up of this group is shown in the figure. It should be pointed out that this group has evolved through no fixed course or plan, but has just grown. When a problem has arisen which has appeared to warrant the assignment of permanent personnel, an individual

has been assigned to the problem, either through employment of a new group member or the utilization of an employee with the necessary educational and experience qualifications.

The fields of effort are self-explanatory on the chart shown. In the organizational setup of the engineering division this group functions under the supervision of the chief interiors design engineer, since the responsibility to design for all matters within the fuselage is delegated to this section, excepting, of course, such matters as would specifically and obviously fall to other sections, such as air conditioning, equipment, power plant, etc. In all matters reflecting the human reaction, the human engineering group serves in an advisory capacity to these other sections. This is particularly true when a specific model is in the preliminary design stage. As an illustrative example, I shall outline some of the studies which have been carried out at the request of the jet transport study program section and the preliminary design section relative to human factors as they might affect the design criteria of a commercial jet transport.

Two major studies were carried out in the cockpit area. One of these dealt with the location of crew and instrumentation, based upon a comprehensive study of crew duties under varying flight conditions, including possible emergency conditions. Upon the basis of this study it was possible to advise concerning the optimum location of instrumentation to provide the maximum utilization of personnel, at the same time eliminating unnecessary duplication of effort and instruments. The second of these studies has dealt with the complete redesign of the pilot's seat, reducing the mechanical complications to a minimum and, at the same time, increasing the comfort and maneuverability of the seat as a means of delaying fatigue of the pilot and obtaining the maximum efficiency.

Several studies have dealt with the passenger cabin. One of the more important of these studies related to passenger seating. Here, as in the pilot seat, complete redesign was resorted to. The result is a seat capable of fitting a greater percentage of the population with a higher level of comfort. Such additional fields were explored as the optimum design of leg and foot rests, quality control of manufactured parts necessary for maintenance of maximum comfort, determination of the point beyond which quality control does not give reasonable return, optimum aisle clearance, and headrest development.

In connection with the passenger seat, two other studies were carried on. One comprised a statistical evaluation of seat width with relation to the percentage of population fitted. (Turn to page 130, please)



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CHROME PLATED OIL RINGS

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Since 1921 ... The engine builders' source!

Have you heard about Muskegon's great new advance in piston ring design and manufacture? It's really new, different, better than ever before... a multiple-piece ring that handles like a one-piece ring!

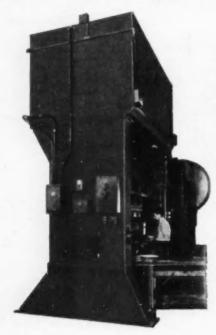
Have you heard how it's done? The secret is Muskegon's patented *Unitizing* process that holds the pieces together in the right order for quick, easy installation. Then, as the engine starts to run, the special adhesive dissolves completely in the hot oil . . . leaves the parts of the ring free to function perfectly and independently of each other.

But seeing is believing. Test Muskegon's CSR-200 rings in your own engines, in your own laboratory. Discover for yourself how the mirror-smooth chrome plated rails reduce ring , wear and bore wear, scuffing and friction. You'll be amazed at the resulting longer engine life and increased oil economy!

Now listen to this: the price of these better rings is just half that of chrome plated cast iron oil rings! Isn't that music to your ears? Write today for complete details.



RYERSON - HAYNES Selects WARCO LINE on Performance Records . . .



Ryerson-Haynes of Jackson, Michigan, a large automotive stamping concern, recently built a new addition and added a large group of WARCO Presses, because they knew from past experience they could depend on Warco to deliver highest production at low maintenance cost.

People who have WARCO Presses working in their plants find, upon checking maintenance records and press operators' opinions, that WARCO Presses are out in front when it comes to low cost production and operator preference. If you're not now using WARCOs, contact our local representative and he will refer you to a user in your area - for he knows that where users compare, where performance at low cost is a factor, WARCO is your best buy.

THE FEDERAL MACHINE & WELDER COMPANY

WARREN, OHIO



(Continued from page 128)

Based on this statistical approach a mathematical formulation was evolved for a minimum weight fuselage crosssection perimeter, as related to seat width and population fitted.

A study was carried on to determine the optimum size and location of emergency exits, as related to escape times, in conformity with similar CAA studies.

Flight tests were carried out in which passenger reactions were taken relative to varying window dimensions, in order to determine the optimum window size.

Two projects relative to passengers are currently under way. One is concerned with the utilization of direct and indirect lighting under conditions of high altitude luminosity, both as regards passenger cabin and cockpit lighting. Concurrent with this study, the effects of high altitude luminosity on fabric colors and textures are being explored on behalf of the industrial design group. The second project delves into the aero-sanitation problem. This project includes both the problems of an integral water supply system and an integral wastes disposal system. In this connection, a study is being carried on among current air carriers determining accurate amounts of wastes produced, as related to flight time, food and liquor consumption and diurnal variations.

Several studies have been carried out which affect the aircraft as a whole. Chief among these are the acoustical studies. This problem has been approached by a variety of means, including theoretical considerations based on information obtained from the power plant manufacturers. correlation of expected conditions to known conditions in existing aircraft. including jet aircraft in the same speed range, and the use of a fullscale acoustical mock-up, simulating the various flight conditions relative to noise production.

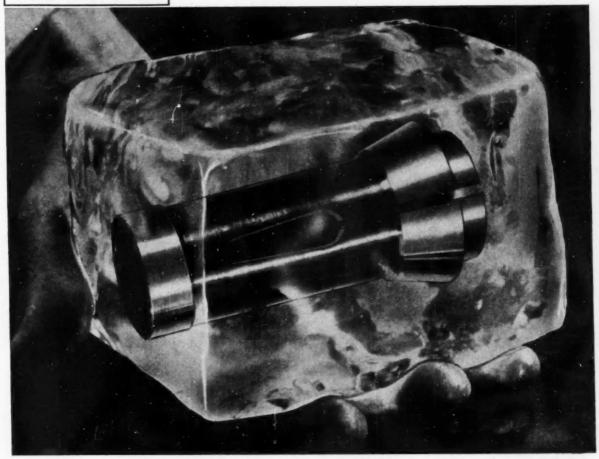
Physiological studies have been done relative to decompressions, wherein the physiologic state of the passengers was considered following decompressions of varying intensities, ranging from the simple loss of a cabin window to the largest hole sustainable by the aircraft, while still maintaining operation and maneuver-

Based upon the results of the above study, theraneutic and emergency oxygen supplies and equipment requirements have been determined. Upon these same results operational characteristics of the aircraft were

(Turn to page 135, please)

ANTISEP All-purpose water-soluble base

-fortified for heavy duty machining



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All-purpose water-soluble base

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You needn't sacrifice topnotch lubricity—nor anti-welding properties—to get maximum cooling ability . . . ANTISEP Base is what you need. Especially in high speed machining.

ANTISEP water-soluble cutting base carries heat away fast... so fast that just-machined work can be handled barehanded! And it's fortified to provide exceptional lubrication as well.

Put ANTISEP to the test on your toughest metal cutting jobs—notice how tools keep free of chip build-up—how parts come off with a finish to make any machinist proud!

Ask your Houghton Man . . . or write to E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa. . . . to arrange a trial production run in your plant.

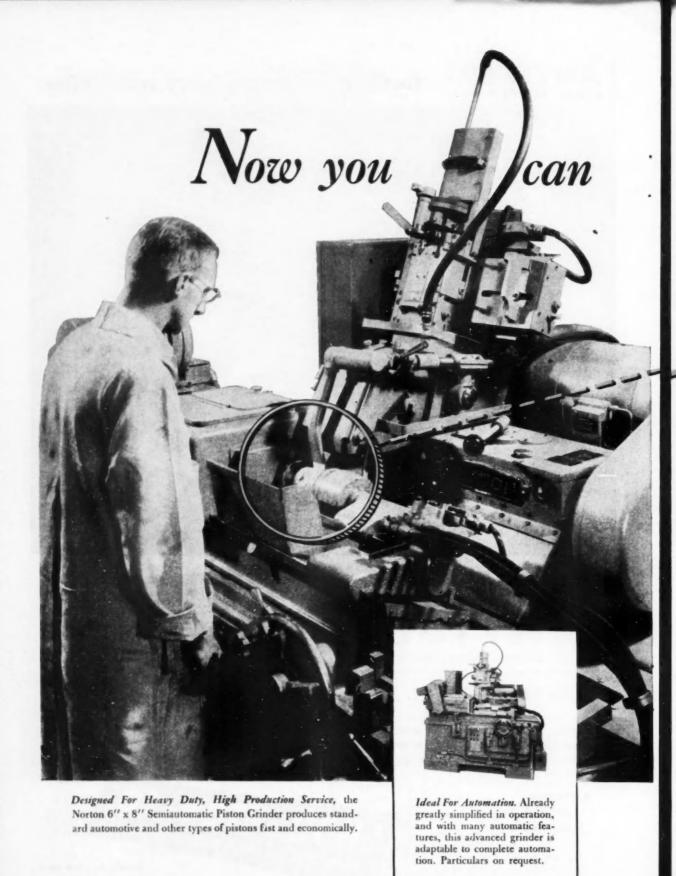
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The Norton 6"x8" Semiautomatic Piston Grinding Machine produces more pistons and lowers your costs

Fast automatic sizing is just one important advantage of the Norton 6" x 8" Piston Grinder. This is assured by the repetitive accuracy of the easily adjustable "micrometric-type" revolving screw wheel feed mechanism—plus the heavy wheel spindle unit that resists wheel pressures—plus the rugged cam generating mechanism that provides enduring accuracy of the motion required for piston skirt form. And this rapid action is built-in for the life of the machine, thanks to massive proportions and generous wear surfaces.

Other High Production Advantages:

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Automatic Wheel Truing. Merely touching a
push-button sends the automatic wheel
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time and skill usually required for truing,
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abrasive removed, thus reducing the wheel
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on how the Norton 6" x 8" Semiautomatic Piston Grinding Machine can benefit your production. See your Norton Representative, or write direct for Catalog No. 742. And remember: only Norton offers you such long experience in both grinding machines and grinding wheels to help you produce more at lower cost. NORTON COMPANY, Worcester 6, Massachusetts In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5.

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Making jet engines thrive on strange diets in many climates requires the most exacting specifications in a pliable part. That's why C/R Sirvene (synthetic rubber) was the logical choice for this fuel control regulator diaphragm. It handles fuels ranging from kerosene up through the aromatics. It feeds them fast, under high pressure, and does the job dependably at -65° and 200°F. plus. Like all Sirvene parts, this diaphragm is completely custom developed—through design, compounding of oil-resistant elastomers, molding, and laboratory-like control of production. Also, it is the result of cooperation . . . the complete cooperation that C/R engineers will be glad to provide for your similar problems.



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Human Engineering in Aircraft Design

(Continued from page 130)

assessed from a human factors standpoint, arriving at criteria, such as the required rates of descent under varying emergency conditions, which were employed by the SAE A-9 Sub-Committee in the preparation of SAE Aeronautical Information Report No. 33, currently in press.

An evaluation of the air conditioning system was done in relation to such items as contamination by toxic materials and temperature and humidity control from a health and comfort standpoint.

Many of these studies have been completed, some are still in progress, and many will never be completed, since it must be emphasized that human factors studies are continuing efforts in common with most other fields of endeavor in the aeronautical sciences.

It seems obvious that human engineering has many facets and much to offer to the design engineer. All of the design engineers with whom I have worked have been anxious to obtain such information and quick to apply it to design criteria. From such acceptance there can be little doubt that when a commercial jet transport is produced, it will reflect much of the work being done through human engineering and will be efficiently designed for the transport of man.

The foregoing is from a paper presented by the author at the Annual Summer Meeting of the Institute of the Aeronautical Sciences he'd in Los Angeles, Calif.

FLOW COATING

(Continued from page 100)

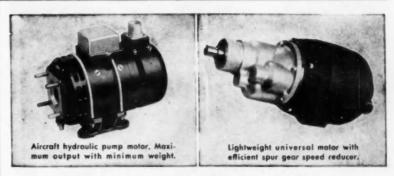
them, and one to stamp and inspect. Parts progress through the flow coater on a 320-ft long conveyor line with hangars at one ft intervals. The line is operated at a speed of 10 fpm. Hooks and clamps on the conveyor are used for hanging parts, and make the conveyor line adaptable for heavy as well as light weight parts, though the bulk of the parts are light weight. A wide variety of sizes can be handled in the flow coater. For large quantities of small parts, long vertical "Christmas tree" hangars are used. The flow coater's 20-ft long chamber will accept sheet parts up to five by 20 ft, but because of the conveyor configuration at Northrop, parts are limited to five by six ft.

Inside the flow coater, 12 nozzles are used to spray parts. Paint pressure and the number of nozzles to be used can be readily controlled by the operator. Each of the spray heads can be operated singly or in groups.

When parts leave the flow coater after being painted, they run through a compressed air "blower" area, to eliminate droplets before entering the drying oven. A total of 192 heat lamps, in two banks, handle three conveyor lines in the drying oven. The drying

zone is 14 ft long, and is heated to 150-180 F by the infra-red radiation. While only one conveyor line handles the work from the flow coater, there are two other conveyor lines simultaneously going through with parts which have been painted in the two spray booths in the paint shop—one 140 ft long handling color spraying and the other 290 ft long handling zinc chromate spraying.

An added feature of the flow coater is its automatic carbon dioxide fire protection system. The system features automatic shutdown of pumps, conveyors, and closing of stack dampers in the event of fire.



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ARE MOST IMPORTANT ...



- In a recent survey, conducted by one of the leading trade journals serving the metal working field, design engineers gave the following as major objectives they were seeking through redesign of their products:
- Reduced Costs
 Improved Appearance
- Decreased Maintenance
 Reduced Weight
- Greater Compactness

These goals are identical with the advantages being secured with specially engineered Lamb Electric Motors.

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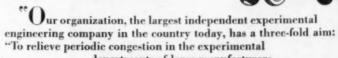
CALENDAR

OF COMING SHOWS AND MEETINGS

ASME-ASLE, first annual lubrica- tion conference, Lord Balti- more Hotel, Baltimore, MdOct. 18-19	
SAE National Transportation Meet- ing, Sheraton-Plaza Hotel, Bos- ton, Mass Oct. 18-20	
National Safety Conference and Exposition, Chicago, IllOct. 18-22	
International Motor Show, Earls Court, London, EnglandOct. 20-30	
American Society for Quality Con- trol, eighth New England con- ference, Ten Eyck Hotel, Albany, N. Y Oct. 21-23	1
American Gear Manufacturers Association, semi-annual meeting, Edgewater Beach Hotel, Chicago, Ill	7
National Lubricating Grease Insti- tute, annual meeting, Mark Hop- kins Hotel, San FranciscoOct. 25-27	7
AIEE Machine Tool Conference, Statler Hotel, Detroit, Mich. Oct. 25-2	7
SAE National Diesel Engine Meet- ing, Statler Hotel, Cleveland, Ohio	8
American Society of Body Engineers, annual technical convention, Rackham Memorial Bidg., Detroit, MichOct. 27-2:	
Society for Non-Destructive Test- ing, annual convention, Mor- rison Hotel, Chicago, IllNov. 1-	4
National Metal Congress and Ex- position, International Amphi- theatre, Chicago, Ill	
Fourth Transport Aircraft Hydrau- lic Conference, Park Shelton Hotel, Detroit, Mich Nov. 3-	4
AMA Annual Finance Conference, Hotel Roosevelt, New York, N. Y	
SAE National Fuels and Lubricants Meeting, Mayo Hotel, Tulsa, Okla Nov. 4-	
International Motor Review and Motorama, Los Angeles, Calif., Nov. 5-1	15
Association of National Advertisers, annual meeting, Hotel Plaza, New York, N. Y Nov. 8-1	10
Industrial Tool & Equipment Show, Montreal, CanadaNov. 8-1	
Gray Iron Founders' Society, annual meeting, Homestead, Hot Springs, Va	12
Magnesium Association, tenth annual meeting, Hotel Chase, St. Louis, Mo Nov. 15-1	17
Pan-American Road Race, Mexico, Nov. 19-	
ASME, annual meeting, Statler Hotel, New York, N. Y Nov. 29-Dec.	8
First International Automation Ex- position, 242nd Coast Artillery Armory, New York, N. Y., Nov. 29-Dec.	
National Standard Parts Associa- tion, annual convention, Sher- man Hotel, Chicago, Ill Dec. 6 Society of the Plastics Industry.	-7
Society of the Plastics Industry, fifth Film, Sheeting, and Coated Fabrics Div. conference, Hotel Commodore, New York, N. Y. Dec. 7	-8
Automotive Service Industries Show,	







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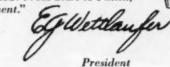
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All under one roof . . . offering complete facilities, from designing and engineering to finished metal working models.

AUTOMATIC CONTROLS Take Over

(Continued from page 67)

Some instrument makers feel there is a need for greater exchange of information between themselves and machinery builders and users. They believe many opportunities exist to reduce manufacturing costs by proper instrumentation, if only they knew what the problems are. One means suggested to provide this information is a forum on instrumentation perhaps following the pattern of the successful Vickers Hydraulic Forum instituted this year.

Recent Control Developments

A bird's-eye view of recent new machines and processes reveals many noteworthy control developments. One example is the Ex-Cell-O constant surface speed control for facing operations. This is important when machining titanium parts, and is said to provide faster cycle times on cast iron. An electronic armature and field voltage control for the spindle motor is provided by GE or Raytheon. Motor control sets from Westinghouse are also used. A feedback signal is used to correct for varying load by electronically gearing the spindle to the cross slide leadscrew.

Versatile heat treating is provided in an automatic batch furnace by Holcroft. A large master Leahy control panel and two smaller panels for safety controls operate a battery of six furnaces. They are used in connection with a conveyor draw furnace, wash machine and hot salt quench tank. Automatic controls maintain the furnace atmosphere, operating temperature, and processing time. They also select one of three quenching methods and the proper amount of agitation. Automation of the work through the line is provided.

Several automatic testing features are incorporated in a new 21-station line index, automatic cycle special machine introduced by Snyder, for processing the intake manifold of a V-8 engine. The passages through the part are automatically tested for leakage and for proper volume of air

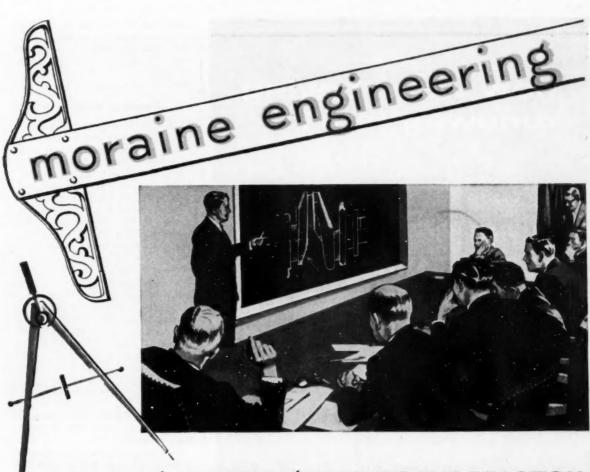
Testing for leakage is accomplished by sealing all of the manifold outlets with steel pads to which neoprene sheets have been vulcanized and which are held tightly against the part by means of hydraulic cylinders, the part being tightly clamped during the testing operations. The tests are an integral part of the machine cycle.

Testing for air volume flow is accomplished by blowing air through the manifold passages in required volume and any restriction in air passage is then detected through a rise in pressure. If a part is found to be faulty in any of the test stations, a mechanical memory is activated which causes the part to be rejected when it reaches the next station, and a repaired part is moved into the line to replace it.

Packaged electronic circuits offer simplified maintenance. Circuits controlling a Hydra-Matic vane-sorting machine at Detroit Transmission Div. of GMC are easily replaced in seconds when trouble develops.

An additional refinement on this idea is provided in Sealpak components for Reliance Electric adjustable speed drives and electronic regulators. The simple, basic circuits are





WHERE THE 'IMPOSSIBLE' BECOMES THE PRACTICAL

The "impossible" often proves to be not only possible but practical at Moraine, where engineers have a habit of thinking into the future and anticipating the solutions to customer problems. From this practice of looking ahead have come many important developments by Moraine for the automotive and other industries. Moraine engineering supplies the imagination, initiative and know-how needed to produce newer, better and more economical ways of interpreting the ideas of the modern designer.



Certain cars with power brakes needed a safety feature that would maintain reserve power for braking. Moraine provides that reserve power—an electrically driven vacuum booster pump that maintains an adequate vacuum reserve.



Moraine friction materials, able to withstand great heat and friction, are widely used in Powerglide, Hydra-Matic and Dynaflow automatic transmissions. Their use has spread to other applications . . . from military vehicles to home appliances.



From the truck and bus fields came a request for a tougher bearing to meet the severe requirements of heavy-duty engines. Moraine came up with the answer in the Moraine-400, the toughest automotive engine bearing ever made!



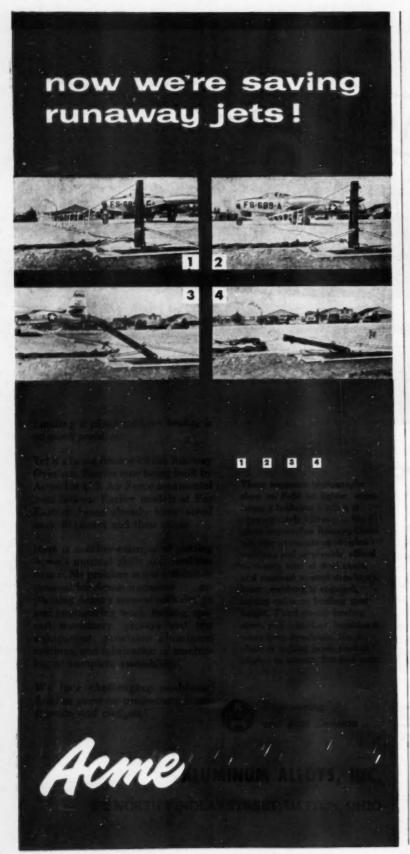
Manufacturers are learning that Moraine, through its broad metal-working experience and constructive attitude, has provided a solid foundation for the use of metal powder parts in industry. Every day, Moraine proves "It can be done!"

THESE PRODUCTS, TOO, ARE MORAINE

Moraine-100 engine bearings . . . Durex gasoline filters . . . Moraine porous metal parts . . . Delco hydraulic brake fluids . . . Delco master cylinders, wheel cylinders and parts . . . Moraine conventional engine bearings and electric motor bearings.



moraine



made up in expendable packages which are sealed in plastic for freedom from the effects of vibration, humidity, and dirt. The panel-mounted units have the tubes on the face for easy replacement.

Trends in Production

Stockpiling of work in process is being widely discussed. Controls are being used to provide automatic shunting of workpieces around idle machines or lines. The cost of stockpiling automatically is presently thought to limit the usefulness of this idea for reducing the number of duplicate production lines required to insure a steady flow of work. Some parts banks now in operation take in parts automatically, but the parts are removed by hand.

Some builders, such as Cross Co., believe that production equipment is beginning to exceed the abilities of human beings to properly schedule and maintain it at reasonable efficiency. In order to bring up the efficiency in existing equipment and insure efficient operation of the more complex machine tools of the future, instrumentation must be applied to overall control. Scheduling production, maintenance, downtime and change-overs automatically is becoming a necessity.

Extending this idea, plantwide master control for the flow of work and materials through all manufacturing processes is thought by some to offer savings. Tighter scheduling to reduce inventory, and greater flexibility for intermixing and changing products are mentioned as advantages.

Machine tool builders note a trend to faster cycling, with the consequent need for new types of control equipment.

Load-measuring devices are receiving study by automotive manufacturers as well as suppliers. Means of measuring the spindle torque and forces on cutting tools are being evaluated, to increase tool life and prevent machine overloads. Load measuring on assembly of force-fit parts is also under test, to improve product quality.

Production noise testing of running parts such as gears is on the increase. Several firms should have some interesting developments to reveal on this subject in the near future.

Automatic programming of a family of different workpieces through one machine, by means of magnetic tape or other information-gathering device, is becoming a reality. The Gen-

(Turn to page 144, please)



ROADRANGER® is Tops!

Super Service Motor Freight of Nashville, Tennessee, specified a new tractor...and got it! The new ROAD-RANGER-equipped White WC-24-TD tractor is setting performance records.

Here's what the "Big Three" of Super Service report on their R-95-C ROAD-RANGERS:



Owner, R. M. Crichton, "Completely satisfied. With the 10

evenly-spaced forward speeds we're taking hills at 35 mph when 15 mph was good before . . . cutting one hour off our 10-hour run."

Maintenance Supt., Ray Carter, "Best transmission we ever had. We



expect longer engine life due to consistently higher engine rpm."

Driver Supt., Walter Haynes, "Our drivers are always bragging about higher road speeds and easier shifting."

From more than 110 different models available for rubbertired equipment from 100 to 400 hp; engines from 330 to 1440 cubic inches . . .



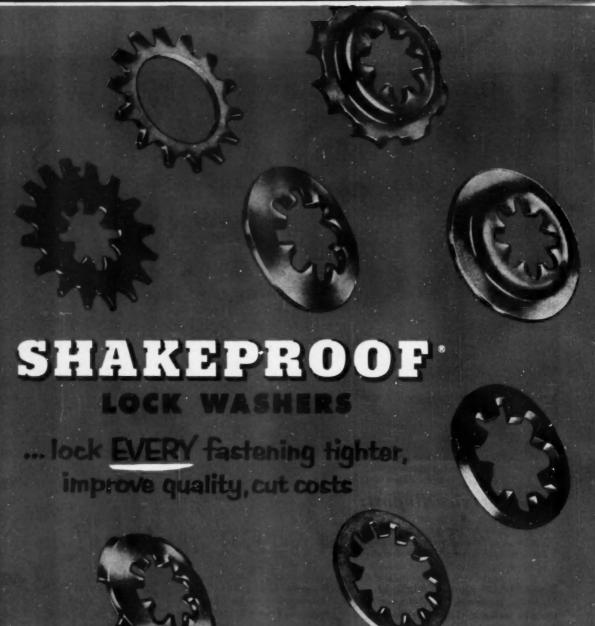
there is a transmission designed with your job in mind. Specify a Fuller Transmission for your equipment.

The performance of Fuller geared equipment working in every major industry in all types of on- and offbighway service has been so outstanding that leading truck manufacturers standardize on Fuller Transmissions.



FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO, MICHIGAN

Unit Brap Forga Division, Milwaukee 1, Wisc. . Shuier Axto Co., Louisville, Ky. (Subsidiary) . Western Dist. Branch (Sales & Service, All Products), 641 E. 180h 51., Qukland 6, Caf.









Locking a countersunk screw was a problem until Shakeproof developed Countersunk Type Lock Washers. Tapered twisted locking teeth give positive protection against loosening . . . put a stop to costly rejections and customer complaints due to loose screws. Assembly is faster, too, because screws lock tight at lightest touch...you get a perfect fastening every time!

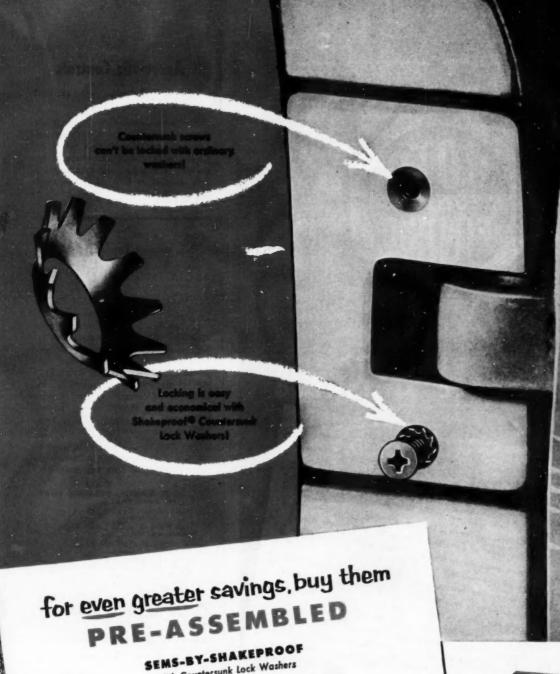
Whatever your lock washer needs, there's a Shakeproof Lock Washer specifically designed for the job . . . designed to save costs and time on the assembly line!

"Fastening Headquarters"

DIVISION OF ILLINOIS TOOL WORKS

St. Charles Road, Elgin, Illinois . Offices in principal cities In Canada: Canada Illinois Tools Limited, Toronto, Ontario





With Countersunk Lock Washers



All Shakeproof® Lock Washers can be All anakeproons Lock washers can be pre-assembled with screws to eliminate separate washer handling . . . and reduce costs!

You're certain to improve quality, too, because the lock washer can't be omitted.



Shakeproof also developed pre-assembled nuts and lock washers. They are fast, easy to use, always lock tight. With KEPS, every fastening is not total anglest vibration because is protected against vibration loosening.



FREE testing sample ki

Test Shakeproof Lock Washers on your own products . . . right in yo own product laboratories. See ho they lock even tighter as vibration increases; improve quality . . and cut costs in your assembly. Send for your kit now.



Automatic Controls

(Continued from page 140)

eral Electric process for milling aircraft wing profiles on a Giddings and Lewis machine, and others which are so far largely classified projects, are opening new areas for future profitable uses of controls and instrumentation.

New Defense Facilities

Dupplementing the list of Certificates of Necessity issued up to July 28, 1954, authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which was published in the September 15 issue, page 168, of Automotive Industries, the following additional certificates were announced by the Office of Defense Mobilization, covering the period from July 29 to August 25, 1954.

The figure appearing in parentheses is the percentage authorized in respect to actual fast tax write-offs.

ARCTURUS MANUFACTURING CORP., Venice, Calif.

Aircraft parts-\$114,733 (45)

BETHLEHEM STEEL COMPANY, Johnstown, Pa. Steel products—\$440,000 (50)

FAIRCHILD ENGINE AND AIRPLANE CORP., Fairchild Aircraft Div., Hagerstown, Md.

Military cargo airplanes and spare parts -\$61,404 (50)

HAMILTON MANUFACTURING COM-PANY, INC., Hamden, Conn. Aircraft parts—\$100,000 (40)

LOCKHEED AIRCRAFT CORP., Burbank, Calif. Military aircraft and parts—\$138,637

REM-CRU TITANIUM, INC., Midland, Pa. Titanium and titanium-alloy mill products—\$12,775,000 (75) Titanium—\$360,000 (90)

REYNOLDS METALS COMPANY, Corpus Christi, Texas
Alumina—\$1,500,000 (85)

UNITED AIRCRAFT CORP., Hamilton Standard Div., Windsor Locks, Conn., Research and development of aircraft components-\$1,175,340 (65)

UNITED AIRCRAFT CORP., Pratt & Whitney Aircraft Div., East Hartford. Conn.
Aircraft engines \$580,000 (65)
Milltary aircraft \$460,000 (50)

UNITED STATES STEEL CORP., Allegheny County, Pa.
Research and development—\$6,132,000 (50)





How much weight to a horsepower? Take one of our P&H Diesels — divide its weight by its power — and that's the figure you get.

The reason we're so proud of our baby: at 7 pounds, 6 ounces this horse is full grown! No competing diesel can produce a full horsepower to that amount of weight. Pound for pound, this engine out-powers them all.

Dollar for dollar, too. A P&H will give you more horsepower per dollar than any other diesel. And just as a sort of extra, it's also the easiest to service!

Not that it will need much servicing. Actually, a P&H Diesel takes less of it than the old gasoline engine. Its fuel cost: about one-third.

Some baby!

P&H Diesel Engine Division, Harnischfeger Corporation, Crystal Lake, Ill.



Horsepowers, 30 to 255. Twocycle. 2, 3, 4, 6-cylinder models. Speeds to 1800 rpm. Stationary, mobile, marine. Dieselgenerator sets

THE PaH DIESEL

*lowest price per horsepower .
*lowest weight per horsepower

Thin Wall Ducting in Jet Engine Planes

(Continued from page 68)

work is the extremely light gages used, dictated by weight-saving demands. Wall thicknesses run from 0.008 in. to 0.020 in. with duct diameters ranging from 1.5 to 7 in. These gage limits impose exceptional problems on all production processes.

Tubing can be obtained either by welding rolled sections or using seamless tubing. Lengths are limited to relatively short runs in order to provide greater flexibility for installation and replacement purposes. The sections are fitted together with especially designed elbows, T-joints, Yconnections and other fittings which are precision-built to meet the stringent requirements.

Fusion and resistance welding and brazing are methods used to join duct components. Thin wall thicknesses present added welding problems. For instance, in butt welding sections together a slight misalignment of only 0.0005 in. may render parts which are only 0.016 in. thick unfit for service where it would not be a cause for rejection with exhaust system ducts which are 0.050 in. thick.

Another cause for concern is the welding of very thin sections to heavier gage fittings. Ryan welds ¼ in. flanges to tubing that is 0.020 in. thick with special jigs and fixtures to prevent distortion. With such differences in thickness, the welding heat is dissipated at widely varying rates in the two components, tending to cause uneven heating and severe distortion.

For the higher temperature systems, resistance and fusion welding are preferred for joining the components, rather than brazing. Silver brazing alloys do not possess sufficient strength characteristics at 750 F to handle compressed air under a typical condition of 250 psi. A number of other brazing alloys, such as copper types, do have high strength properties at elevated temperatures but require high temperatures for brazing.

Copper brazing demands a temperature of 2050 F. This is exceedingly high for production of thin wall structures. If the parts are brazed in a furnace, the holding fixtures are subjected to a withering blast of heat which renders them useless. If they are induction brazed, heating is so rapid and temperatures so near the critical temperature of the parent metals that it is difficult to prevent distortion and deterioration.

Welding techniques produce sound joints which meet every demand of service. Inert gas-shielded arc welding is a favorite for this work because it involves localized application of heat which can be controlled. Low electrical currents are employed due to the thinness of the metal. This results in very short arcs which are often hard to see. Prerequisites of good welding results are careful edge preparation and close fit-up because the molten weld puddle is very small and slight burrs on the parts can cause a break in surface tension which will permit burn-through.

Thin wall ducting systems must have good flexibility and range of movement to accommodate thermal expansion and allow for movement of airframe structures. This is achieved by the use of a variety of devices such as movable joints, bellows and expansion bends.

At first glance, bellows-type joints would appear to answer the need because they are a gas-tight device of



Engineered to deliver maximum torque - with minimum size - ROCKFORD CLUTCHES provide abundant brawn, without unnecessary bulk. Springloaded and over-center, single or double-plate, or multiple-disc types fit compactly into product designs. If your project calls for a drive that must fit neatly into limited space, consult ROCKFORD clutch engineers - while your size problem still is on the drawing board.

Send for This **Handy Bulletin**

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes



capacity tables, dimensions and complete specifications.

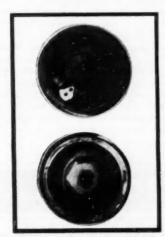
ROCKFORD CLUTCH DIVISION BORG-WARNER

ROCKFORD CLUTCHES



Du Pont operator at the control panel of the JET ROOM in the Petroleum Laboratory at Deepwater, New Jersey.

DuPont Petroleum Laboratory acquires new JET fuel research facilities



Domes from the combustion chamber of a 2" jet burner contrast the effect of an experimental additive in reducing carbon formation. In both cases JP-4 referee fuel was used.

With the jet age advancing at a fast pace, refiners and engine designers are being faced with new and troublesome problems involving the combustion characteristics of jet

To help in the solution of these problems, the DuPont Petroleum Laboratory has recently added jet research equipment as part of its program for investigating jet combustion. The effect of various additives for improving the performance of jet fuels is currently being studied and work is progressing on three of

the most pressing problems . . . (1) carbon deposition, (2) nozzle clogging and (3) smoke.

This work on jet fuel additives is part of a continuing, and extensive, research program at the Petroleum Laboratory and other associated Du Pont laboratories. As data are collected and evaluated, they will be made available to the petroleum, aviation and automotive industries.



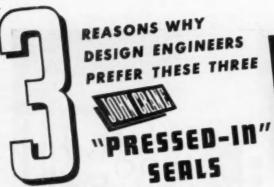
Petroleum Chemicals

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Petroleum Chemicals Division • Wilmington 98, Delaware

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STATIONARY SEALING HEAD TYPE 11-A



A. Seal Retainer

Synthethic Rubber Bellows.

Metal Band. Spring.

Holding Dents.
Precision-Lapped Sealing Washer



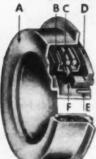
This pressed-in packaged sealing unit is designed with the spiral steel spring inside of the synthetic rubber bellows to protect it against corrosion.

The spring clamps the flange of the bellows tight against the bottom of retainer and the metal ferrule squeezes the top portion of the bellows against the "Teeplelite" washer.

This liquid-tight seal is especially recommended for small shafts on hot or cold water, oil, gasoline, kerosene, soapy water

Use this seal on: Low Pressures to 35 PSI Temperatures -65°F. to +220°F.

STATIONARY SEALING HEAD TYPE 6-A



A. Seal Retainer.

B. Metal Ferrules.

Precision-Lapped Sealing Washer

E. Holding Dents. F. Synthetic Rubber Bellows

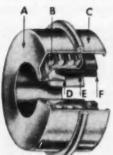


This pressed-in packaged sealing unit is designed with a spiral steel cadmium plated spring (stainless or bronze optional) assembled between two metal ferrules which clamp the flanges of the synthetic rubber bellows tightly against the retainer shell and the Teeplelite" washer.

This liquid-tight seal is especially recommended for small shafts on hot or cold water, oil, gasoline, kerosene, soapy water.

> Use this seal on: Medium Pressures to 75 PSI Temperatures -65°F. to +220°F.

STATIONARY SEALING HEAD



Seal Retainer.

Spring.

D. Wedge of Teflon.

Sealing Washer. Precisan-Lapped Face.

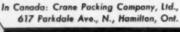


This pressed-in packaged sealing unit is designed to use a wedge sealing ring of Teflon*. This wedge shaped sealing ring closely fits the inner sleeve of the retainer and makes a liquid-tight contact with cone surface of carbon washer.

The result is a liquid-tight seal which is especially recommended for hot oil, and all chemical liquids or gases, hot or cold.

Use this seal on: High Pressures to 150 PSI High Temperatures +485°F. Low Temperatures -120°F.

Write for fact-filled catalog. Crane Packing Company, 1835 Cuyler Ave., Chicago 13, Ill.



CRANE PACKING COMPAN

good flexibility. While bellows are suitable for some installations, they have been found to be inadequate for high-pressure, high velocity systems. Under high pressure they tend to straighten out and must be anchored against this contingency. This reduces their flexibility. When used with high velocity air streams, bellows corrugations cause severe turbulence and with sonic speed air they cause shock waves which shorten the life of the duct system.

U-type expansion bends and loops are useful in providing a means for meeting thermal expansion movement but these strategems do not provide anything approaching adequate flexibility and they tend to straighten out under pressure. They also cause drag and high friction losses which decrease the energy available from the air flow.

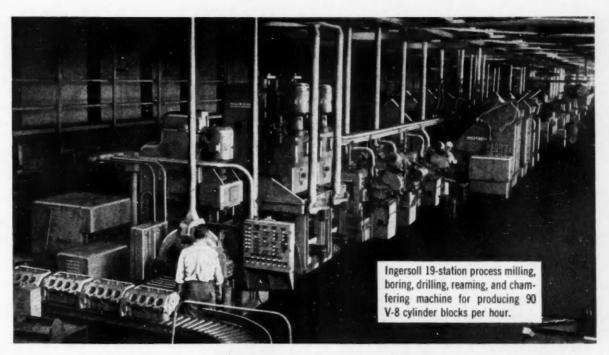
Rvan has developed ball-and-socket joints and slip-type joints to thin wall ducting. The ball-and-socket type provides for universal action while the slip-joint permits lineal movement required to meet thermal expansion demands. Combinations of the two types are used where all conditions must be handled.

In addition to joints based on standard configurations, new designs which are tailored to handle thin wall ducting needs have been created. These light-weight sheet metal and machined components are said to have performed well under the most rigorous test conditions.

Because high strength and corrosion resistance are indispensable properties of thin wall ducting materials, stainless steels are used. However, the possibilities of employing other metals such as titanium, Inconel X, and Armco 17-7PH in these applications are being investigated.

BOOKS ...

METALWORKING TOMORROW, by R. L. Coughlin, Jr., W. H. Draper, III, W. D. Evans, G. D. Hall, M. M. Mansson, Kjell Marthinsson, D. R. Powers, and C. M. Roberts, published by Harvard Graduate School of Business Administration, P. O. Box 86, Cambridge 39, Mass. Price, \$10.00. This report is the result of an intensive study of 12 new processes significant in the future of metalworking by eight students at the Harvard Business School. Particular emphasis has been placed upon the potential development and application of these processes, evaluated with the manufacturing executive in mind. In-cluded are discussions of: shell molding; investment casting; powder metallurgy; cold extrusion; heavy press program; electrolytic grinding; and ultrasonic machining



uses VICKERS, hydraulics

One operator controls this entire machine in which a total of 20 milling, 18 boring, 16 chamfering and 4 drilling spindles are at work simultaneously. A hydraulic transfer mechanism moves the V-8 engine blocks automatically from station to station . . . turning them as needed . . . clamping and unclamping. Feeding of the tools is also done hydraulically. The entire operation is controlled by electro-hydraulic circuits from the loading station.

Vickers Hydraulics was used throughout by The Ingersoll Milling Machine Company. Among the advantages gained by using Vickers Hydraulics are: (1) simplification of design, (2) flexibility of control, (3) instantaneous response, (4) ease of providing interlocks and overload protection, (5) low maintenance with minimum down time.

The Vickers Application Engineer near you will gladly supply any additional information you may desire regarding the many benefits to be gained by using Vickers Hydraulics.

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Representative Standard VICKERS Units Used on Ingersoll Transfer Machines



Single Stage Balanced Vane Type Pump



Double and Two-Pressure Balanced Vane Pumps



Power Unit is Self-Contained



Solenoid Controlled Pilot Operated 4-Way Valve



Traverse and Feed Cycle Control Panel



Balanced Piston Type Relief Valve

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

More Defense Contract Awards

This latest list of defense prime contracts that have been awarded covers the period from August 14 to September 14, 1954. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks,

airplanes, automotive components and spare parts, automotive maintenance equipment, etc.

ACF INDUSTRIES, INC., New York, N. Y.
Depot services for armored vehicles—
\$500,000

AIRESEARCH MANUFACTURING CO.,

Los Angeles, Calif.
Hot wheel assy—149 ea—\$192,657
Turbine assy—386 ea—\$207,147
Maintenance parts—Various—\$58,539
Pneumatic starters, special parts, special
tools and test equipment—938 ea—
\$2,349,834

AMERICAN BOSCH CORPORATION, Springfield, Mass. Fuel injection equipment—12,350—\$62,480

Repair parts—30,000—\$128,651

AMERICAN WHEELABRATOR & EQUIP-MENT CORP., Mishawaka, Ind. Machine, blast, cleaning and spare parts

-8-\$51,217

AUTOMATIC TRANSPORTATION COMPANY, Chicago, III.

Trucks, tiering, electric—20—\$77,900 Trucks—42 (1 lot)—\$271,722

THE BAKER-RAULANG COMPANY, Cleveland, Ohio Trucks, fork-65 (1 lot)-\$275.502

BALDWIN-LIMA-HAMILTON CORP., Hamilton, Ohia Repair parts—785—\$51,932

BARBER-COLMAN COMPANY, Rockford,

Maintenance parts for various aircraft
—Various—\$37,321

BENDIX AVIATION CORP., Bendix Products Div., South Bend, Ind.

Brace assy, main gear actuating rod—78 ea—\$105,758
Spare parts for P&W J57-P11 engines—Various—\$105,982
Main wheel assy—908 ea—\$2,139,172

Main wheel assy—908 ea—\$2,139,172 Brake assy—908 ea Brake assy—1104—\$1,904,046

Engine parts for P&W J57-P13 engines— Various—\$172,806 Carburetors—Various—\$209,802

BENDIX AVIATION CORP., Eclipse-Pioneer Div., Teterboro, N. J. Bearings—46,100 ea—\$82,205

Bearings—40,100 ea—\$82,205 Fuel/air combustion starter—185 ea— \$563,325

E. W. BLISS COMPANY, Hastings, Mich. Press, mechanical—10—\$54,100

BOEING AIRPLANE COMPANY, Wichita,

Implementation of production—\$5,000,000 Facilities—\$5,529,300

BOEING AIRPLANE COMPANY, Seattle, Washington Facilities—\$565,000

BORG-WARNER CORPORATION, Pesco Products Div., Bedford, Ohio Spare parts—Various—\$34,390

CATERPILLAR TRACTOR COMPANY, Peoria, III, Tractors—2—\$60,662 Spare parts—I lot

Ripper-I ea

992

CINCINNATI MILLING AND GRINDING MACHINES, INC., Cincinnati, Ohio Milling machines—8—\$169,960

CLARK EQUIPMENT CO., Battle Creek, Mich. Tractors, warehouse, gasoline — 146 —

\$339,959 Trucks, fork, gas powered—52—\$174,674

CLARK EQUIPMENT CO., Ross Carrier Div., Benton Harbor, Mich. Straddle carrier, spare parts—44—\$413,-

CONSOLIDATED VULTEE AIRCRAFT CORP., San Diego, Calif. Facilities—\$2.874.700

THE CROSS COMPANY, Detroit, Mich.
Milling machines, special double-end,
single end—2—\$198,428
(Turn to page 154, please)



Branch Factory: Tyrone, Pa.

CLEARING

How a CLEARING PRESS BOOSTS

Die Making Capacity

for BRUST TOOL

Brust Tool Mfg. Company moved into their new plant in Franklin Park, Illinois, recently with a plan for: a truly modern shop having top facilities and equipment for large scale die making. Their plans included the 600 ton Clearing hydraulic press shown here. Brust's new Clearing, with its bed area of 96" x 96", makes it possible to test and make sample runs from large area dies and actually broadens the range of die work they are able to do.

If your plans for the future include expanding your press working facilities or retooling with more productive equipment, call on Clearing Machine Corporation.



CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION - 6497 West 65th Street, Chicago 38, Illinois - HAMILTON DIVISION, Hamilton, Ohio

Another Spicer FIRST ...

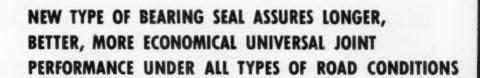
A REAL THREAT
TO JOINT LUBRICATION
HERE

Improved Universal Joint Seal!

PLENTY OF

JOINT LUBRICATION

PROTECTION HERE



Mud . . . sand . . . dust . . , water—these are ever-present factors of destruction that have always put a heavy drain on universal joint life.

Now Spicer . . . famous pioneer in universal joint design . . . has developed a new lip-type seal that protects Spicer joint bearings under all operating conditions.

This new Spicer synthetic rubber seal has been tested and proved in military and commercial truck use for over three years. Performance records attest the ability of the seal to prevent foreign matter from contaminating bearing lubricants. And that this seal will stand up much longer than any other type previously used.

Result: Less universal joint bearing wear. Fewer repairs and replacements. Less "down" time.

The exclusive new Spicer seal is available only in Spicer Universal Joints for original equipment, and in Spicer Universal Joint replacement kits for servicing older vehicles.

DANA CORPORATION

TOLEDO 1, OHIO



SPICER PRODUCTS:

TRANSMISSIONS
UNIVERSAL JOINTS
PROPELLER SHAFTS
AXLES
TORQUE CONVERTERS
GEAR BOXES

POWER TAKE-OFFS
POWER TAKE-OFF JOINTS
RAIL CAR DRIVES
RAILWAY GENERATOR DRIVES
STAMPINGS
STAMPINGS
STICER and AUBURN CLUTCHES

Defense Contract Awards

(Continued from page 150)

CURTISS-WRIGHT CORP., Wright Aeronautical Div., Wood-Ridge, N. J.

Maintenance tools for engines—\$725,000
Training equipment

DeVLIEG MACHINE COMPANY, Detroit,

Boring machine, jig boring and milling, with extra equipment Contractor's jig model 3B—2—\$73,950

FORD MOTOR COMPANY, Dearborn, Mich.

Facilities for research and development and production of certain automatic weapons—\$107.423 FORD MOTOR COMPANY, Ford Div., Washington, D. C. Automobiles—13 ea—\$18,272

FRUEHAUF TRAILER COMPANY, Detroit, Mich.

Trailer, fire control van—33 ea (5 lots)
—\$701,066

GENERAL ELECTRIC COMPANY, Schenectady, N. Y.

Generator, tachometer—2160 ea—\$64,864 Aircraft engine starter generators—103 —\$63,758

GENERAL ELECTRIC COMPANY, Cincinnati, Ohio

Spare parts-\$1,500,000.

GENERAL ELECTRIC COMPANY, Dayton, Ohio Generators, aircraft spare parts—173— \$93,427.

GENERAL MOTORS CORP., Chevrolet Motor Div., Detroit, Mich. Light trucks—36 ea—\$55,827

GENERAL MOTORS CORP., Cleveland Diesel Engine Div., Cleveland, Ohio Repair parts—7383—\$332,643

GENERAL MOTORS CORP., Detroit Diesel Engine Div., Detroit, Mich. Repair parts—7040—\$75,548

GENERAL MOTORS CORP., Electro-Motive Div., La Grange, III. Repair parts—17,590—\$142,392

THE GOODYEAR TIRE & RUBBER CO., Akron, Ohio

Wheel assy-1134-\$248,934

Brake assy—76 ea
HERCULES MOTORS CORP., Canton,
Ohio

Repair parts-2525-\$47,695

CARL HIRSCHMANN CO., INC., Man-

hasset, N. Y.
Automatic screw machine including motor
—46—\$310.645

Press, shaving-6-\$51,407

HUGHES TOOL CO., Aircraft Div., Culver City, Calif.

Armament parts-Various-\$338,788

I H C EXPORT COMPANY, Chicago, III.
Tractor, spare parts—I ea (1 lot)—
\$17,896

LOCKHEED AIRCRAFT CORPORATION, Marietta, Georgia Facilities—\$100,000

McCULLOCH MOTORS CORP., Los Angeles, Calif.

Launcher and chute assy—298 ea—\$427,-652

McDONNELL AIRCRAFT CORP., St. Louis, Missouri Maintenance parts—Various—\$4,496,991

MARQUARDT AIRCRAFT COMPANY, Van-Nuys, Calif.

Aircraft power supplies—8 ea—\$64,222
NORTH AMERICAN AVIATION, INC., Los

Angeles, Calif.
Implementation program—\$10,000,000

REO MOTORS, INC., Lansing, Mich. M44 series trucks 2½ ton—132 ea— \$799.857

SOLAR AIRCRAFT COMPANY, Des Moines, lowa Installation of machine tools—\$429,320

TITEFLEX, INC., Newark, N. J.
Primary lead assy—4610 ea—\$108,796

WESTINGHOUSE ELECTRIC CORP., New York, N. Y. Electric motor equipment—167 ea—

\$260.665
WILLYS MOTORS, INC., Toledo, Ohio
Jeeps—8 ea—\$10,339

Light trucks and spares—18 ea—\$33,313

YALE & TOWNE MANUFACTURING, Yale
Materials Handling Div., Philadelphia, Pa.
Trucks, tiering, electric—10—\$37,600

AUTOMOTIVE INDUSTRIES . . .

is your News Magazine of Automotive and Aviation

MANUFACTURING





High-strength aluminum-alloy nuts meet AN steel nut tensile loads. Nylon locking inserts guarantee reusability through 50 on-off cycles.

Approved for use on Air Force, Army and Navy aircraft, the new ESNA Blue "J's" are lighter than any other self-locking nuts of equivalent strength.

Intended for use with AN steel bolts and lubricated to minimize thread wear, the new ESNA Blue "J's" provide a smoothly uniform torque-tension relationship and forestall thread galling. They accomplish maximum fastener weight savings without sacrificing strength. Completely inter-

changeable with equivalent steel parts.

Briefly, here's what we offer:

STRENGTH . . . Tested and approved to AN tensile strength specifications for steel nuts of the same size.

AVAILABILITY... sizes #6 through %" in designs that offer every important standard hex and anchor configuration including one lug, two lug, and corner types, floaters and gang channel.

NYLON INSERTS... in all anchor and channel types provide extended reusability—assuring elimination of maintenance problems created by replacement of "fixed" or inaccessible fasteners which are riveted or welded to the structure (hex nuts available with fiber or nylon inserts) and assuring the vibrationproof holding power, reusability and self-locking action provided in all ELASTIC STOP® nuts.

ELASTIC STOP NUT CORPORATION OF AMERICA



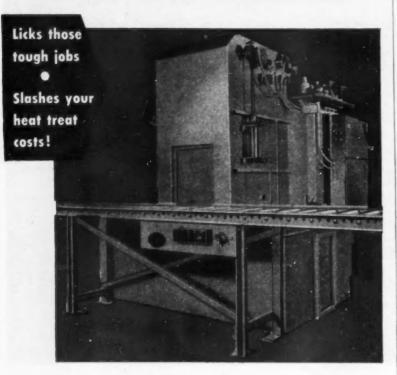
Mail Coupon for Design information

Elastic	Stop Nu	t Corp	peration	of Am	erica		
Dept.	N46-105,	2330	Vouxhall	Road,	Union,	New Jersey	
Please	e send m	e the	followin	g free	fasten	ing information:	
1	D-A-H		PALA BL.	- 1151-0		Man to a death and	

	ELASTIC	STOP nu	t bulletin	What self-locking fastener would you suggest
Name				
40m*				

Street _______ Zone ___State

DOW'S "J-800" SHORE



"NO-GAP" OPERATION—A batch type furnace with less than 30 seconds between loads. Work chamber is never exposed to air. Loading is accomplished while slow cooling or quenching a previous load.

GREATER PRODUCTION—Actual field operation has proven conclusively that the Dow Model J-800 will easily bring 800 pounds from room temperature to 1500° F in less than one hour.

COMPACT CONSTRUCTION—Occupies floor area of only 7 '10" x 14 '4" giving maximum production for minimum floor space.

VERSATILITY—Ideal for carbonitriding, gas carburizing, clean hardening and carbon restoration. Hot oil quenching and atmosphere cooling equipment available.

EXCLUSIVE FEATURES — High capacity fan combined with heat capacitor assures uniform case depth throughout each load • Forced circulation of quench oil assures uniform hardness with minimum distortion • Sealed quench tank gives cleaner stock—minimizes fire hazard.



12045 Woodbine Ave., Detroit 28, Mich.
Phone: KEnwood 2-9100

NEW M-400 FURNACE
BOOTH 1041
Chicago Metal Show
November 1 to 5



The floor of a new military turboprop transport will be stronger than a modern skyscraper's footthick concrete floor interlaced with reinforcing steel.

Through use of fuselage dive brakes, a modern high-speed combat plane's vertical dive speed can be cut from 500 to 300 mph.

One modern transport aircraft can carry cargo equal to the weight of more than 140 Wright airplanes.

The scheduled airlines of the U. S. have flown more than 85 billion passenger-miles — the equivalent of a giant airlift transporting every living human on earth a distance of 34 miles—since civil aviation was officially recognized by Congress 27 years ago.

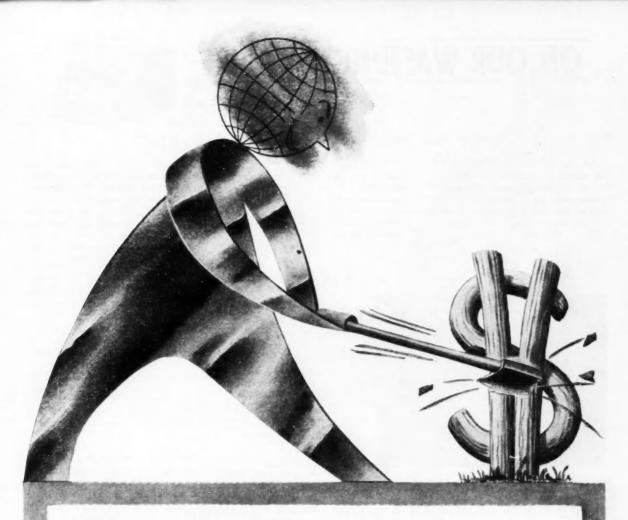
To bring oil to Americans in 1953, the oil industry drilled approximately one mile of hole every 14 minutes.

Total footage of oil wells drilled in 1953 was close to 200 million ft. If all this drilling had taken place in one spot, the hole would have gone through the earth almost five times.

Oil industry production of motor fuel for U. S. cars, buses, and other vehicles rose in 1953 to 1.289 billion barrels, enough to fill the world's largest reservoir over five and a third times.

Seventeen per cent of the total power consumed by this nation in 1953 was used to propel motor vehicles.

Benefits to employees now cost U. S. companies an average of 37ϕ an hour or \$670 a year for each worker.



At the '54 Metal Exposition—Nov. 1-5 . . . 50,000-PLUS METALS INDUSTRIES MEN WILL LEARN NEW WAYS OF CUTTING COSTS!

Your competitors ... thousands of 'em ... will be on hand at this great industrial event to check closely on everything that's new and improved ... everything that will help them build better products ... cheaper ... faster!

They'll come from all corners of the land . . . these 50,000-plus metals industries men . . .

and they'll take away with them, when this great Metal Show ends, more ideas . . . more information and more know-how than any 'stay-at-home' executive could possibly match!

Owned and Managed by

AMERICAN SOCIETY FOR METALS
W. H. Eisenman
Managing Director
Chester L. Wells
Ass't. Director

CHICAGO NOV. 1-5

NATIONAL METAL

NATIONAL METAL CONGRESS

ON OUR WASHINGTON WIRE

An estimated \$6.4 billion will be spent on highways this year by all segments of Government. Commerce Dept. estimates. This represents an increase of \$650 million over a year ago and \$2.3 billion more than in 1950.

Justice Dept. will not tell a firm whether a planned merger is legal or illegal. However, any proposed plan of merger that is submitted will be examined and, if it appears to follow the law, the parties will be so advised.

Information describing just which new machine tools the Military Forces believe they should be allowed to buy with Vance Plan funds is being weighed by top logistics officials in the Defense Dept. Best estimate is that first contracts for tools will go out in November or December.

Declining defense expenditures over the past year have played a major part in the drop in manufacturers' new orders, latest figures show. Commerce Dept., in a detailed comparison of the budget for fiscal 1955 and Government spending in recent years, shows that for the year ending last June 30, Defense Dept. orders amounted to only \$28 billion, almost \$18 billion less than the previous year.

Guaranteed-wage plans for the steel and/or automobile industries are beginning to look more and more like good possibilities for 1955. Negotiations over guaranteed wages probably will take priority over all other points at issue in contract talks this winter, it is believed in Government

State treasuries netted \$2.2 billion in agsoline taxes last year. This amount made up a large part of the \$6.5 billion the states received from all taxes on sales and gross receipts. Another \$1 billion came from the levy on motor vehicles and drivers' licenses.

General manufacturers' sales tax would displease many retailers, but Treasury Dept. may ask for one next year.

Bill for new federal buying of 22 critical materials for the national stockpile in the current fiscal year will be about \$145 million. Materials bought under this program are intended to help meet stockpile goals, Office of Defense Mobilization says.



Takes Mill Steel - Cleans It, Applies and Dries the Coating with Speeds Up to 400 Sheets per hour

Here is another example of F-D engineering efficiency. The Power Spray Washer, shown in this completely automatic installation in the plant of a major appliance manufacturer, meets and solves important production problems. A special washer such as this was required to not only clean mill steel but to amply good drug on the Site Country.

Completely Automatic Installation in Major Appliance Plant
but to apply and dry a Dry Film Coat for
drawing, stamping, etc. Migh productivity requirements were met by P.D engineering this washer to handle the flat pieces
at speeds up to 400 per hour. This Two Stage Washer and Forced Dry Oven is heated by direct gas fired, vertically sted heaters

PETERS-DALTON is an organization of specialists-staffed by men who KNOW the answers to your problems. Power Spray Washers (like the one illustrated) of all sizes, types and required uses, can be developed to meet your needs by P-D. Regardless of size-from a single unit to a complete system-an installation by Peters-Dalton can be depended on to Regardless at size-from a single unit to a complete system—an it give you the service and production you have the right to expect.

The two photographs at the right are actual-ly continuing views of a Two Stage Washing Machine with Blow-Off Saction. Flat sheets enter this continuous unit for cleaning and conting and exit completely finished at high speeds to the right.



P.D. one of the world's largest manufacturers of Complete Finishing Systems-also builds . . .

- Hydro-Whirl Paint Spray Booths Industrial Washing Equipment
- Drying and Baking Ovens
- Hydro-Whirl Dust Collecting Systems



NEW	POWER	SPRAY	WASHER	BULLETIN

Mama	
Finls	
Company	
Street Address	
City	

Here it is -

HANSEN

QUICK-CONNECTIVE RING-LOCK COUPLING





Effectively handles far more volume than any coupling of equal dimensions

Tough, compact, smaller, the new Hansen Series 3-RL Coupling will handle any job in your shop using 3/" to 1/6" connections—from the air line to the air tool. No longer is there any need for various sizes of couplings at different points in your hook-up. The Hansen Series 3-RL, with completely interchangeable sockets and plugs does it all—makes it easy to keep stock of parts in balance—holds inventories to a minimum.

Carefully designed, the Hansen Series 3-RL combines maximum flow with compact construction. Sockets are brass with steel sleeves—plugs are steel. Sockets for use with small hand-operated air tools are available in aluminum.

Write for Descriptive Literature



POSITIVE LOCKING Ring Lock Provides Practically 360° Metal to Metal Contact

• Equipped with automatic sleeve lock, the Hansen Series 3-RL Coupling is quickly and positively connected merely by pushing plug into socket. To disconnect, just turn the sleeve. Locking ring in socket is forced into greove in plug, provides practically 360° metal to metal contact, reduces wear, and insures tight fit.

THE HANSEN

MANUFACTURING COMPANY

4031 WEST 150th STREET

CLEVELAND 11, OH10



Production is increased and quality of the work is improved over former hand spray method

● When General Electric formerly hand sprayed their home laundry equipment—automatic washers and dryers—they painted 9.74 washers with a gallon of paint. Now, in the new and modern plant at Appliance Park, Louisville—where they're using the Ransburg No. 2 Process—they get 17.97 units per gallon of paint. An increase of 84%!

And, where they formerly got 5.49 dryers per mixed gallon of finish, now—with the Ransburg No. 2 Electrostatic Spray Process—they get 9.56 dryers per gallon of paint. An increase of 74%!

Along with increased production, G.E. is getting a more uniform, higher quality finish. Another typical, on-the-job-example of the unmatched efficiencies of the Ransburg No. 2 Process of electrostatic spray painting!

Want to know what Ransburg Electrostatic Processes can do for you in your finishing department? Ask about the complete facilities for test-painting YOUR products—under simulated production conditions—in Ransburg laboratories.

Kansburg ELECTRO-COATING CORP.



Forging Alloy

(Continued from page 102)

these heavier sections develop tensile and yield strengths only 4000 to 7000 psi lower than the values shown above for sections up to seven in thickness. For hand forgings over seven in thick, the maker will negotiate guaranteed minimum properties for particular sizes on an individual order basis.

Other typical properties for X7079-T6 include:

Weight 0.099 lb per cu in.; electrical conductivity 31 per cent IACA; thermal conductivity at 25C, 0.29 CGS units. Tests on both smooth and notched specimens indicate that the fatigue strengths of X7079-T6 forgings are similar to those of 7075-T6. This relationship is true for specimens taken in the longitudinal and transverse directions. The forging characteristics of X7079 are similar to those of 7075 alloy, and therefore sections of comparable design will be available in the new alloy.

Solution heat treatment is carried out at somewhat lower temperatures than those employed for 7075 alloy. Quenching and artificial aging practices are also different.

Limited testing indicates this alloy is at least equal and probably superior to 7075-T6 from the standpoint of resistance to stress corrosion cracking. Alloy X7079-T6 has shown longer life than 7075-T6 at the higher stress levels in these tests.

Machinability is expected to be the same as for 7075-T6; however, because of its lesser susceptibility to mass quenching effect, the greater uniformity of hardness and mechanical properties obtained throughout the cross section with X7079-T6, should make for more uniform machinability.

Limited tests conducted on large hand forgings and die forgings have shown X7079-T6 to be somewhat less susceptible to distortion during machining operations than 7075-T6 and 148-T6

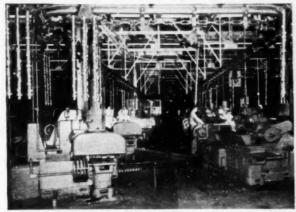
At the present time there are no government or customer specifications for X7079 alloy. Steps are being taken to request the inclusion of this alloy in Federal Specification QQ-A-367Cc. At the September, 1954, meeting of the Aeronautical Material Specifications Committee of the Society of Automotive Engineers, the preparation of an AMS specification for this alloy was requested. Aluminum Co. of America.

Circle 99 on posteard for more data

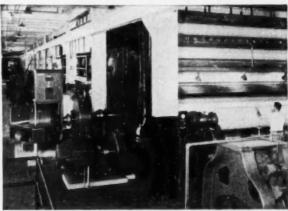
BUILT AND APPLIED BY RELIANCE

THE Tools of Automation

INCREASE PROFITS IN EVERY INDUSTRY



In a camshaft production line, Reliance V*S Drive system provides stepless, easily adjustable speeds for fast, precision machining. Optimum cutting speeds extend tool life, reduce downtime.

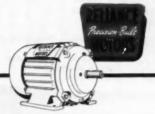


On a high-speed newsprint machine, the Reliance V*S Drive system provides unsurpassed accuracy and dependability, maintaining precise speed relationships and correct draw adjustments between all sections.



Greater machinery output . . . improved production efficiency . . . both result in increased profits. And both result from using the Tools of Automation: Reliance electric motors, adjustable-speed drives, electronic controls, and applied engineering. They're setting new standards for low cost production in *every* industry.

These Tools of Automation can most efficiently lower your costs, because they're designed and applied to your specific situation. Reliance Application Engineers are backed by nearly 50 years' experience in perfecting the drive systems that can help you attain the degree of automatic production you require. For further information, write for the new booklet, "The Tools of Automation".



RELIANCE ELECTRIC AND ENGINEERING CO.

Sales Representatives in Principal Cities

1123 Ivanhoe Road, Cleveland 10, Ohio

"CHICAGO"

precision valve gear parts

OSTEEL OCAST IRON OSTEEL and IRON



Cylinder Head Studs......Cylinder Head Cap Screws Roller Followers......Ball Joint Assemblies

External and Internal Grinding, Thread Grinding, Precision Roll Threading

Heat Treating • Curbon Restoration • Carbonizing • Carbo Nitriding • Cyaniding • Hydrogen Brazing • Complete Metallurigeal,
Dynamometer and Tosting Laboratories

Special Screw Machine Parts 1/6" to 5" Diameter

- . Cold Upset 3/4" to 1" Diameter . Cap Scrows
- . Set Scrows . Nuts . Studs . Taper Pins
- Socket Screw Products

The CHICAGO SCREW COMPANY 2801 WASHINGTON BLVD BELLWOOD ILLINOIS Established 1872

What's New at the

National Metal Show

(Continued from page 80)

Welding Process

Working demonstrations of Bernard American nard-Arc slag-gas shielded welding process will be presented continuously during show hours using both fully automatic and semi-automatic equipment. Bernard-Arc welding employs a coiled electrode with the flux incorporated in the core to refine the base metal and to provide an inert shielding slag for the weld metal. A separate gas shields the arc column. The arc is fully visible at all times. Metal & Thermit Corp. Booth 409.

Circle 53 on postcard for more data

Power Slide



Among the machine tool attachments to be exhibited will be a variety of manual and power-feed slides or traverses. This precision compound anti-friction slide with accordion type of sleeves to protect the reciprocating cross-traverse features consists of hardened and ground bars with circulating type of ball bushings. Slides are hydraulically controlled air powered with adjustable control of the fine-feed. A separate manual cross feed to accommodate the work head is equipped with zero to five deg swivel base. (Standard Electrical Tool Co. Boothe 1028) Circle 54 on postcard for more data

Carbon Controller

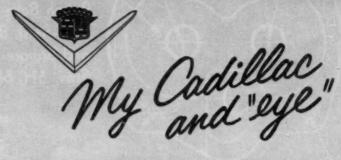
THE Autocarb automatic continuous carbon controller will be featured. This instrument, used in conjunction with the dew point recorder, provides for continuous control of the carbon potential of the furnace atmospheres. It is used for control of furnace atmosphere in gas carburizing, clean hardening, and other heat treating processes. The exhibit will

(Turn to page 166, please)

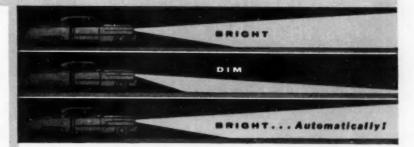
PARTNERS FOR NIGHT DRIVING SAFETY







Autronic-Eye—a new standard of safety for the "Standard of the World"! This latest General Motors engineering "first" handles the complete job of headlight control electronically! When an oncoming car approaches at night, the Autronic-Eye automatically dims your headlights—holds them dim until all traffic has passed. Then back to bright—automatically! The amazing Autronic-Eye makes night driving much simpler and safer for more than 350,000 car owners.



AUTRONIC-EYE

Another

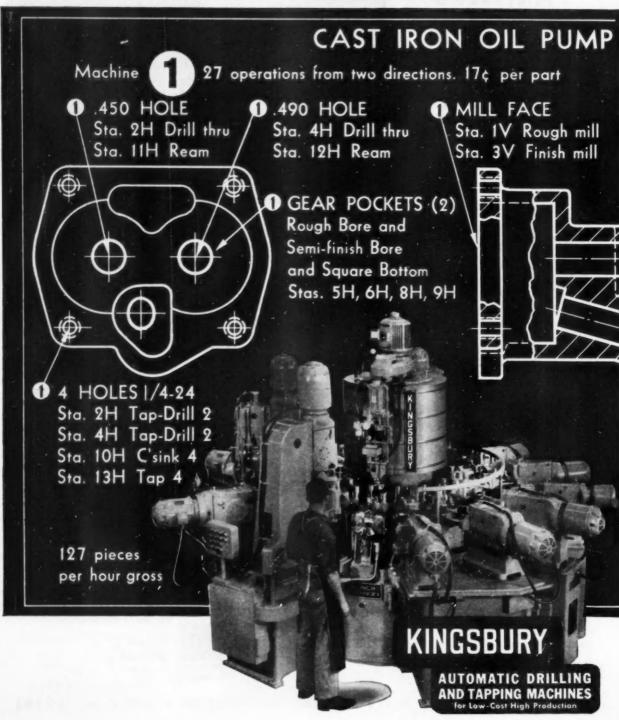


First!

® Trademark Registered U.S. Pat. Off,

GUIDE LAMP DIVISION . GENERAL MOTORS CORPORATION . ANDERSON, INDIANA

"Operations Kingsbury" These two machines, working as a team, perform an <u>average</u> of 3879 operations per hour, machining 102 <u>interchangeable</u> parts

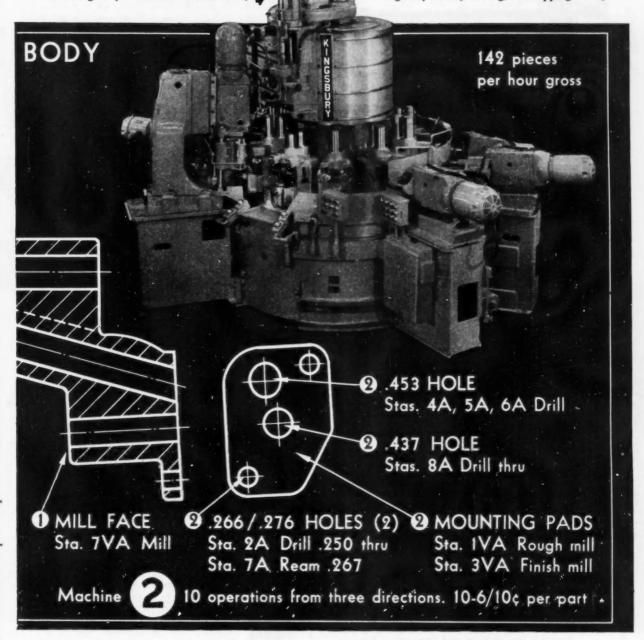


The blueprint tells only part of this Kingsbury story. The rest is told in Keene, New Hampshire, in one of the most modern machine tool plants in New England. Here Kingsbury engineers study your part specifications — for your Kingsbury must do the operations you require at the rate you name.

Each Kingsbury machine is custom-built,

but it is never built "from scratch." Even the workholding fixtures, specially designed for each part, are developed from a background of years of experience and

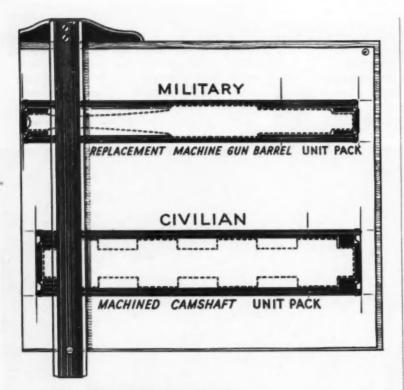
> knowledge of what is required for accuracy and safety — and what works. Every mechanism has been tested in field service. Standard Kingsbury bases, drilling, and tapping units,



indexing mechanisms, lubricating and cutting-oil systems, electrical and mechanical controls . . . all are coordinated in an automatic machine which must perform correctly "first time round" — and year after year in your plant. Perhaps our mental attitude has a lot to do with the success of Kingsbury machines. We are

specialists. Since 1918 we have built more than 5,000 Kingsburys and we know what a Kingsbury can do. When we tell you a Kingsbury can do your job to your satisfaction, we're ready to prove it!

KINGSBURY MACHINE TOOL CORP. 108 Laurel Street, Keene, N. H.



CLEVELAND CONTAINERS

Military spare parts, highly machined metal parts, delicate electromechanisms and fragile items can be packaged better, and at less cost, in fibre containers.

CHECK THIS LIST OF ADVANTAGES

- . . . May be constructed to meet all the requirements of Methods-IA, II and IC4 Packaging, under approved military specifications.
- . . . Low cost.
- . . . Economical cubage and weight.
- . . Reduction or elimination of intermediate and overpacks.
- . . Tailored to your product—built-in cushioning, special barriers and liners where required.
- . . . High resistance to side impact, bending and compression.
- . . . High intraplant and feeder plant re-use.

The Cleveland Container Company offers skilled engineering help. Take advantage of the convenience and economy available in fibre containers.

Why pay more? For Good Quality . . . Call Cleveland!



What's New at the

National Metal Show

(Continued from page 162)

also present special and standard Heat Treat equipment for all heat treating processes. Surface industrial gas burner equipment and Janitrol unit heaters for industrial plant heating will also be included in the display. Surface Combustion Corp. Booth 714.

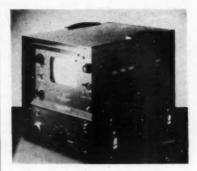
Circle 55 on postcard for more data

Finds Hidden Defects

I MMERSCOPE is the name of a radartype inspection instrument for detecting flaws beneath the surface of metals. To indicate resolving powers, discontinuities 3.64 in. in diameter can be detected 1/10 in. below the surface with a 25-megacycle signal from the instrument. It operates at frequencies of 2.25, 5, 10, 15 and 25 mc. A "pip" type presentation is provided by the built-in oscilloscope with sevenin. screen, the so-called A-Scan.

Also to be shown are the B-Scan television-type viewer which shows a cross-section of the metal. It provides scanning speeds up to 1.5 ft per sec for production inspection. Electro-Circuits, Inc. Booth 2136.

Circle 56 on postcard for more data



Immerscope defect detector

Surface Pyrometer

Pyro surface pyrometer is available with a selection of 14 different types of thermocouples and extension arms to meet surface and sub-surface temperature measuring problems. It can be equipped with a new quick-change connector which permits the thermocouples to be snapped and locked onto the extension arms in a matter of a second, without any tightening needed. Thermocouples

(Turn to page 168, please)

WASH THAT DIRTY STRIP BEFORE SHEARING and BLANKING

The latest development in McKay coil feed lines is this new strip washing machine which thoroughly cleans the strip after it leaves the coil and before it passes through any subsequent feed rolls.

In most stamping plants a sizeable portion of metal finishing costs and quality control problems can be traced to the fact that some coiled steel is dirty and much of this dirt picks up on the rolls of the processing equipment. The dirt which carries over on the blanks may cause scratches in the drawn panels during the forming operations.

CUT-UP LINES

In several recent installations McKay has furnished a strip washing machine which utilizes high speed brushes and large volume solvent sprays to thoroughly clean the steel strip at high production speed.

CONSULT MCKAY ENGINEERS IF YOU HAVE A PRESS OR SHEAR FEEDING PROBLEM. WE

INVITE YOUR INQUIRIES.

National Metal Show

(Continued from page 166)

are interchangeable without adjustment or recalibration.

Another feature is the lock-swivel which permits locking thermocouples at any desired angle without danger of their jarring loose while the temperature measurement is being made.

Pyrometer Instrument Co. Booth 1120.

Circle 57 on postcard for more data

Combination Mill

Risst public showing of a twohigh/four-high combination mill, with a complete line of laboratory and production rolling mills, slitters and levelers for small and medium production requirements, will be made. The mill can be used for bar, rod and strip reduction; it performs hot flat rolling, cold flat breakdown, cold flat finishing on either a two-high or a four-high setup, and hot or cold rolling of wire and shapes. It features rapid changeover between the two-high and four-high configuration by the removal or insertion of the two smaller work rolls between the larger back-up rolls which become the work rolls of the two-high setup. Stanat Mfg. Co. Booth 1659.

Circle 38 on postcard for more data

Ductile Iron Mold



First public display of a full circle tire mold made of ductile iron will be made. Blades are stainless steel inserts. Anti-och processs aluminum castings also will be shown. (Morris Bean & Co. Booth 2118)

Circle 59 on postcard for more data

Combination Burners

Series 620 Vari-Pressure burners, for oil or combination gas and oil, feature a flame adjusting lever to change the flame from a short bushy shape to a long narrow shape. They will be shown together with series 630 combination type radiant tube burners, diluted flame (excess air) nozzle-mix gas burners, new sizes of adjustable flow valves, blowers, and complete oil heating and circulating units. Hauck Mfg. Co. Booth 2124.

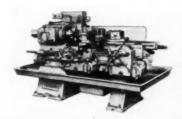
Circle 60 on postcard for more data

Heating Generator

The Ther-monic 25kw output induction heating generator is said to be a completely redesigned unit featuring high loadability and power. It uses heavy wall anode oscillator tubes, and a high current tank circuit adjustable to any one of three frequencies. The generator is totally enclosed having rubber gasketed, hinged, double access doors on either side. An internal cooling system recirculates air throughout the genera-

(Turn to page 170, please)







A NEW 3-WAY MARKETING SERVICE THAT HELPS YOU ACQUIRE NEW MACHINE TOOLS

Jones & Lamson's new 3-Way Marketing Service permits you to see ahead... and plan ahead... without sticking your neck out. This new service offers you a choice of 3 sound methods by which you can obtain new machine tools on terms best suited to your own individual requirements. The three methods: outright purchase; "pay-from-productivity" on a 1-to-5 year basis, at interest rates as low as $3\frac{1}{4}\%$; or any of 4 variations of a truly flex:ble lease plan.

*(add-on rate

JONES & LAMSON MACHINE CO.

523 Clinton St., Springfield, Vermont, U.S.A.

UNIVERSAL TURRET LATHES . FAY AUTOMATIC LATHES . AUTOMATIC DOUBLE-END MILLING & CENTERING MACHINES AUTOMATIC THREAD & FORM GRINDERS . OPTICAL COMPARATORS . AUTOMATIC OPENING THREADING DIES & CHASERS



THERE'S A MIDLAND WELDING NUT FOR EVERY SIZE JOB!

For Fabricating, Fastening, and Assembling Metal Parts...Midland Welding Nuts are the Answer!

No matter what your product—whether big or small—if there's metal fabricating, fastening, or assembling involved, chances are you can use Midland Welding Nuts to big advantage.

Now relied on by manufacturers the world over—and specified universally by product designers—Midland Welding Nuts will lower your assembly costs and speed up operations all along the line for you.

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THE MIDLAND STEEL PRODUCTS CO.

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Detroit 11, Michigan

Export Department: 38 Pearl St., New York, N.Y.

Manufacturers of

AUTOMOBILE AND TRUCK PRAMES AIR AND VACUUM POWER BRAKES AIR AND ELECTRO-PNEUMATIC BOOR CONTROLS

What's New at the

National Metal Show

(Continued from page 168)

tor while providing positive pressurization. A self contained water to water heat exchanger provides full component cooling by the recirculation of distilled water. Automatic check lights isolate any difficulty. The unit is built to conform with JIC, NEMA, AIEE and NEC specifications. Also to be shown is a vertical progressive hardening machine capable of induction hardening shaft from three to 45 in. in length and up to six in. in diameter. It may be used with any Ther-monic electronic generator from five to 50 kw or with motor generator to 250 kw. As the pieces pass through the induction heating coil and quench, the rate of travel is automatically controlled by an adjustable cam, which operates a variable speed electronic drive. Induction Heating Corp. Booth

Circle 61 on postcard for more data

Monocoque Body

A COMPLETELY assembled magnesium truck body employing monocoque construction will be on display. The monocque principle utilizes thick sheet to provide the necessary rigidity.

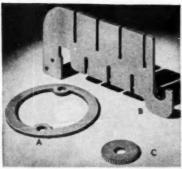
The new line of magnesium mill products produced at its Madison Div. will be highlighted. Representative examples from the new production equipment in operation at the company's magnesium mill products plant at Madison, Ill., including tread plate, tooling plate, flat sheet and plate, coils, and various extruded shapes, will be shown. Dow Chemical Co. Booth 620.

Circle 62 on postcard for more data

Drawing Compound

DRAWING compound which is water miscible in ratios ranging from equal parts to one to 15 parts, and which embodies an exclusive dispersant additive ensuring against caking on dies and knock-out or stripper mechanisms, will be introduced. The product, a mixture of mineral oil, emulsifying agents, non-abrasive pigment, and a dispersion additive, was developed to handle work being processed under difficult forming conditions where an economic miscible material is desirable. It is removed by water washing. The Texas Co. Booth 1529.

Circle 63 on postenrd for more data



A. Sheet stock, shear strips, punch. B. Sheet stock, shear, punch blank, gang saw notches. C. Sheet stock, shear strips, punch blank, mill notches.



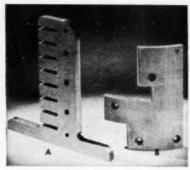
A. Sheet stock, shear strips, punch, form. B. Sheet stock, shear to size, drill, form. C. Sheet stock, shear strips, punch pieces, form in mold twice, rubber stamp twice.



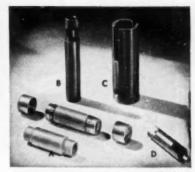
A. Rod (hexagonal), smooth saw, automatic errew machine, turn shoulder thread, champfer and cut off. Remainder are automatic screw machine parts made from Diamond Fibre by C-D-F.



A. Sheet stock, sand, smooth saw to size, smooth saw bevel, smooth saw cerner cut out, drill. B. Sheet stock, band saw, turn OD, hore ID, smooth saw side, drill five hlind holes with jig. C. Sheet stock, sand, hand saw, rough hore ID, hob teeth, finish hore ID, machine keyway.



A. Sheet stock, sand, smooth saw, drill, smooth saw to shape, radius three corners, gang saw nothches. B. Sheet stock, hand saw rough blanks, form, smooth saw width, length and shape, radius edges, drill with jig, countersink.



A. Tube, automatic screw machine, turn shoulders, champfer and thread end, thread other. B. Tube (long pieces), smooth saw, tap threads, screw machine, (small pieces) auto. screw machine, thread, knurl, champfer, cut off. C. Tube, smooth saw to length, punch twice, countersink, D. Tube, automatic screw machine, champfer, cut off, punch.

C-D-F fabricates and forms DIAMOND VULCANIZED FIBRE

FAST . . . AT LOW COST . . . DEPENDABLY

Vulcanized Fibre is a wonderful material if you know where to use it and how to buy it. We suggest on many jobs that it's best to do the fabrication and forming in C-D-F's shops. Why? Because C-D-F knows how. Since 1895 the company has put fibre to work in everything from buggy axle bushings to metal clad radio parts. The handling of thousands of set-ups for high speed, low cost production runs gives C-D-F an "experience bank" to draw from. Shop supervisors have a wealth of short cuts, little tricks that result in lower prices for you. They know the material and its peculiarities.

TOUGH, RESILIENT, STRONG

How long has it been since you examined the unique properties and wide range of C-D-F fibre grades? Vulcanized Fibre is arc resistant, mechanically strong, non-corroding, half the weight of aluminum. Repeated moistening and drying in forming insignificantly alters the nature, structure or quality of the fibre.

Since C-D-F has their own paper mill, uniform, quality control is made possible. Special grades are more easily developed. A good example is C-D-F Abrasive Fibre, a medium density fibre with excellent resin and grit adhesion, now widely used for abrasive discs.

A BIG, RELIABLE SOURCE

C-D-F does business with the largest

tonnage users of sheet, rod and tube fibre in the world. This means good deliveries, good prices, reliable products for every new customer. You deal with a materials engineer, a C-D-F man who knows how to give you the most value in Diamond Vulcanized Fibre. If you want to improve design, simplify purchasing, speed production, use Diamond Fibre and the facilities of C-D-F. Write for catalog, free test samples, or send us your print for quotation.



Continental-Diamond Fibre

CONTINENTAL-DIAMOND FIBRE COMPANY
NEWARK 2, DELAWARE



For dependable oil, fuel and hydraulic brake lines in your trucks, trailers,

See if Bundyweld isn't

What do you need in your tubing?

Should it be leakproof, lightweight? Should it have high bursting point, high fatigue limit? Should it take almost every fabrication operation in the book?

What do you want from your tubing?

Want more peace of mind for yourself and everyone else connected with the production, sale, or servicing of your product? More peace of mind and satisfaction for your customers? Want tubing proved dependable in over 20 years of use in brake lines, fuel lines, hydraulic window lift lines, power-steering-connecting lines, instrument gauges, other applications?

Want your tubing in easily handled straight lengths—clean and ready for your production lines?

WHY BUNDYWELD IS BETTER THEING



Bundyweld starts as a single strip of copper-coated steel.



continuously rolled twice around laterally into a tube of



and passed through a furnace. Copper coating fuses with steal Pesult



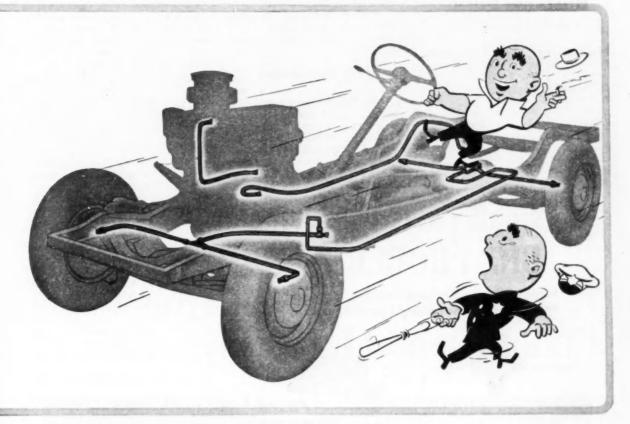
Bundyweld, double walled and brazed through 360° of wal



NOTE the exclusive Bundy-developed beveled edges, which afford a smoother joint, absence of bead and less chance for any leakage.

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A. B. Murray Co., Inc., Pat Office Box 476 • Lee Angeles 35, Cellift. Tubscales, 5400 Alona Ave. • Philadelphia 9, Penas: Ruton & Co., 117, Sonson St. • Santha 6, Cellift. Pacific Metals Co., Ltd., 3100 19th St. • Santha 6, Wash.: Eagle Metals Co., 4755 First Ave., South • Toreste S, Ontaria, Canada: Alloy Metal Sales, Ltd., 181 Fleet St., East.

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tractors or automobiles-come to Bundy, headquarters for automotive tubing.

your kind of tubing

Or would you like it fabricated into the needed parts—exactly to your specifications? Want deliveries timed to exacting schedules and made as promised? Would you like to call in tubing specialists to work with you on design, fabrication, or function problems?

You'll find that Bundyweld Steel Tubing is your kind of tubing—the only tubing double-walled from

a single strip, copper-bonded throughout 360° of double-wall contact. And you'll find that Bundy engineering and fabrication services are right to your liking, too. Call, wire or write us today for any details you'd like or for an appointment with a Bundy sales engineer for an exploratory talk.

BUNDY TUBING COMPANY DETROIT 14, MICHIGAN

Bundyweld Tubing

Business Pulse

(Continued from page 104)

billion. Pressure has thus been created for still further spending cuts. The Secretary of the Treasury, George M. Humphrey, gave emphasis to this fact at a recent press conference when he stated that the prospective \$4.7-billion deficit was "an interim estimate and one that we shall work every day, every week, and every month to reduce." All of this suggests that Federal purchases of goods and

services during the coming year may buttress total demand much less than seemed likely on the basis of the estimates contained in last January's budget message.

Inventory Liquidation

The most recent inventory data also make one wonder about the validity of the widely heard contention that inventory liquidation has just about run its course. Estimates for the end of July indicate that total business inventories declined by \$600 million during that month, on a sea-

sonally adjusted basis. This reduction was larger than the average monthly decline during the first six months of the year. This fact is a little difficult to fit into the picture that has been drawn of imminent slackening of inventory liquidation. Admittedly the pattern may have already changed or, if not, it could still change in time to give fall business a forceful boost. But for the time being such a prospect looks more questionable than it did a short time ago.

Information contained in a recent Government report on business plans for capital expenditure suggests that this type of outlay may not be as much of a sustaining factor in the period ahead as some analysts had anticipated. On the basis of a survey conducted during August, it is estimated that capital outlays by business in the fourth quarter of this year will fall off to a seasonally adjusted annual rate of less than \$26 billion. This would represent a decline of almost three per cent from the estimated rate during the third quarter, about twice as large as the estimated percentage decline from the second to the third quarter. Thus we have no statistical evidence yet that the decline in capital expenditures is abating; quite to the contrary, these latest estimates actually suggest the possibility of slight acceleration. This prospect looms as something of a disappointment in the light of earlier hopes that liberalized depreciation allowances might check the downdrift. The implication is that capital outlays will not be as much of a sustaining influence on the business situation in the months ahead as some people had hoped.

5 small parts to solve BIG PROBLEMS

Some of the smallest parts are big factors in helping a car earn and keep a good reputation.



FASCO LOW PRESSURE INDICATING SWITCH

Dependable signal of dangerous low-pressure—as in engine lubricating or air brake systems.



FASCO AUTOMATIC RESET CIRCUIT BREAKER

Precision calibrated—Permanent protection for electrical equipment—Instant mounting.



FASCO

DIRECTIONAL SIGNAL FLASHER

Compact—Rugged—Adaptable to all circuits—Safe—Economical (no fuse needed).



FASCO

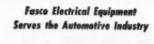
HYDRAULIC STOPLIGHT SWITCH

Accurate — Extremely high safety factor — Proved through 26 years as standard original equipment.



SERIES 400 PRESSURE SWITCH

Versatile (for low and medium pressure applications) — Reliable Available in many forms.

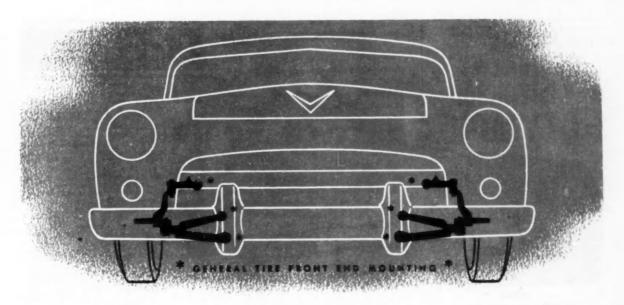




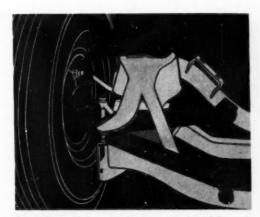
Present Business Outlook

When viewed together, these considerations relating to Federal spending, inventories, and plant and equipment expenditures suggest that this fall's business outlook is not quite as promising as it had appeared, say, at the end of the second quarter. This should by no means be interpreted as a prediction that recovery will fail to materialize this fall. It is simply a recognition that new factors have recently come to light which could retard expansion. Or put in another way, we might say that the forces of expansion may have less help from these particular sectors than seemed likely earlier.

Actually there seems to be a real possibility that higher consumption expenditures may more than compensate for any disappointments in other



Here's* Why Millions Are Driving without the Shakes!



Typical front end suspension showing applications of General's Silentbloc mountings.

Front end Silentbloc mountings developed by General's engineers for leading automotive manufacturers give autos a two-way stretch . . . allow them to float over chuck-holes and insulate passengers from bumps.

This is just another example of the hundreds of successful automotive products that have grown out of General's custom design and production service. We work in extruded rubber and plastic, molded rubber and fiberglas, rubber-to-metal parts, metal stampings, vibration and shock units, and panel mounts. We'll design and produce to your specification.

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Let OLYMPIC help you solve that stamping problem!



METAL PRODUCTS COMPANY, INC. ALPHA, NEW JERSEY

components of gross national product. The improvement which showed up in retail trade in the spring carried over into the summer months and, from all appearances, fall business is off to a buoyant start. Because of the relative importance of consumer spending in the gross national product total, it would take only a relatively small percentage spurt in this category to make a substantial difference in over-all business volume. Thus, even if, say, Federal spending and plant and equipment expenditures do run below earlier expectations, business in general might nevertheless be carried upward by a rise in consumer spending.

No Decline

The element of uncertainty still present in business circles is happily circumscribed in one respect. That is, though businessmen may worry, perhaps, over whether business is really going to pick up this fall or whether instead it will merely drift sideward, they apparently do not lose much sleep fretting over the possibility of a resumption of the earlier decline. They seem convinced, rightly or wrongly, that business now treads on a pretty solid floor.

BOOKS'...

TITANIUM AND TITANIUM ALLOYS. by John L. Everhart, published by Reinhold Publishing Corp., \$30 W. \$2nd St., New York \$6, N. Y. Price, \$5.00. In the few years since titanium became a comfew years since titanium became a com-mercial metal, hundreds of papers have been published dealing with it. These papers are scattered through the transac-tions of a number of scientific and tech-nical societies and through many business publications. It is the purpose of this book to present a selective review of the work covered in these publications and to supplement it with information obtained from the producers of the commercial from the producers of the commercial materials. The book is intended for the engineer or designer interested in the pos-sibilities of applying titanium in the solution of his problems. It is not intended for the producer of titanium.

RESIDUAL STRESSES IN METALS AND METAL CONSTRUCTION, edited by W. R. Osgood, published by Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y. Price, \$16.00. This book describes and carefully evaluates the effects of residual stresses upon the performance of various kinds of structures. formance of various kinds of structures. formance of various kinds of structures. Particular emphasis is placed on the possible contributions of these stresses to fracture. Twenty-two papers offer wide range of information on the origin, magdistribution, etc., of all types of al stresses existing in a structure residual or a machine, whether arising from weld-ing, machining, or other causes. In addi-tion, a special summary covers many asof the residual stress problem, and includes several recommendations future research and study.



Developing and producing specialized rubber parts, compression-molded O-rings and stock mold items . . . to meet customer's exact requirements . . . from natural, synthetic and silicone compounds, is our business. Your inquiry regarding any rubber parts problem, especially in the

design stage, is invited.

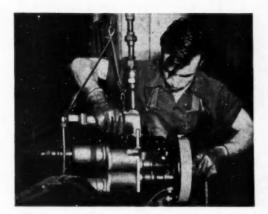
New 4-page brochure and handy file folder tells what Goshen Rubber can do for you. Send for your free copy



Goshen Rubber Co. inc. Goshen, Indiana

NEW!

KELLER 32 ft-lb MULTIPLE NUT SETTER



On an automobile assembly line, the Keller Multiple Nut Setter runs two nuts which attach the front brake plate to the spindle. Spot checking for quality control showed that in 97% of the cases the upper nut held to 48-50 ft-lb, and the lower one to 74-79 ft-lb—a much narrower range than the tolerances allowed by engineering.

Now You Can . . .

★ Set 2 to 6 nuts at once

with Individual Torque Control

- ★ Control torques accurately up to 120 foot-pounds
- * Select torques individually

This newly developed air too! sets two to six nuts simultaneously, and controls the torque on each to such accuracy that hand torquing is a thing of the past. Torque adjustment is built into the head of each spindle, so that each nut is controlled individually.

Spindles are held by a mounting plate designed to fit the bolt pattern. Mounting plates can be made in any toolroom or machine shop. Offset drive spindles allow close spacing where nuts or bolts are closely clustered.

Full information is contained in a new catalog section . . . write for a copy.



KELLER TOOL COMPANY
1317 Fullon Street
GRAND HAVEN, MICHIGAN

67 ft-lb

67 ft-lb

21 ft-lb



You may well be one of a select group of men intently interested in developing tomorrow's jet fighters...special reconnaisance aircraft...jet bombers and transports. The Aircraft Division of Fairchild offers a genuine creative opportunity to such men.

New concepts of flight for the jet era . . . as well as engineering advances on the world-renowned C-119 Flying Boxcar and soon-to-be-produced C-123 Assault Transport are coming from Fairchild. Diversified, stimulating assignments like these increase the inventive challenge to Fairchild's team of qualified aerodynamicists.

Gracious country living only minutes away from urban Baltimore or Washington...paid pension plan... an excellent salary with paid vacations...ideal working conditions...generous health, hospitalization and life insurance... and the many other benefits of a progressive company add to the pleasure of working with Fairchild.

You'll be investing wisely in a secure future if you take time today to write to Walter Tydon, Chief Engineer, outlining your qualifications. Your correspondence will be kept in strict confidence, of course,



REO V-8 Truck Engines

(Continued from page 71)

The fuel system includes a Carter, four-barrel downdraft carburetor, fitted with a mechanical accelerator pump; an oil bath cleaner of hat type; and an AC mechanical fuel pump, driven by an eccentric at the front end of the camshaft.

The extremely compact installation dimensions of this engine stem from some serious planning and arrangement of accessories. For example, the Delco-Remy distributor is mounted close to the end of the block, driven off the end of the camshaft. The coil is mounted nearby. At the front end, it will be noted that the accessory drive has been compressed into small compass. The timing gear drive consists of helical gears, with an alloy cast iron camshaft gear driven by a steel crankshaft pinion gear. Two high capacity Vee-belts drive the fan and water pump. The fan pulley, in turn, has two additional high capacity Vee-belts for driving the generator and Bendix-Westinghouse air compressor.

The centrifugal water pump has been compacted within the outline of the timing gear cover. It has an estimated capacity of 150 gpm at 3200 rpm. Cooling system capacity is 35 qt.

Full pressure lubrication is supplied to main bearings, connecting rod bearings, camshaft bearings, and a restricted supply to rocker arms. Lubrication is supplied by an Eaton rotor pump driven from the camshaft, rated 18 gpm. The lubricating system has a rather unusual arrangement employing two oil filters. One of these is of full-flow type, the other of bypass type, both mounted horizontally on a bracket at the lower end of the crankcase. The crankcase is positively ventilated by means of a Fram ventilator, actuated by an electricallydriven blower, venting through a road draft tube.

Maximum engine speed—3200 rpm—is accurately controlled by means of a Pierce mechanical governor, driven off the camshaft at the front end.

AUTOMOTIVE INDUSTRIES...

is your News Magazine of Automotive and Aviation

MANUFACTURING



Holes on extremely close centers vary in diameter from 1/16" to 1/16". The valve body has 33; the cover, 18.

RUN IS LIMITED."





HERE'S HOW ZAGAR TOOLING SAVED MONEY HAND OVER FIST

This aluminum die casting is processed in its entirety by Zagar planning, except for milling two faces. Two lines of Zagar standardized self-clamping drill jigs ream, tap and drill both valve body and cover. With 24 heads and 24 fixtures, Zagar performs work on 51 holes on

close centers. Step tools take care of reaming and burnishing. The fixtures were designed to compensate for slight inaccuracies in the die casting. Thus has Zagar engineering solved an acute problem of limited production without the purchase of costly special machines.



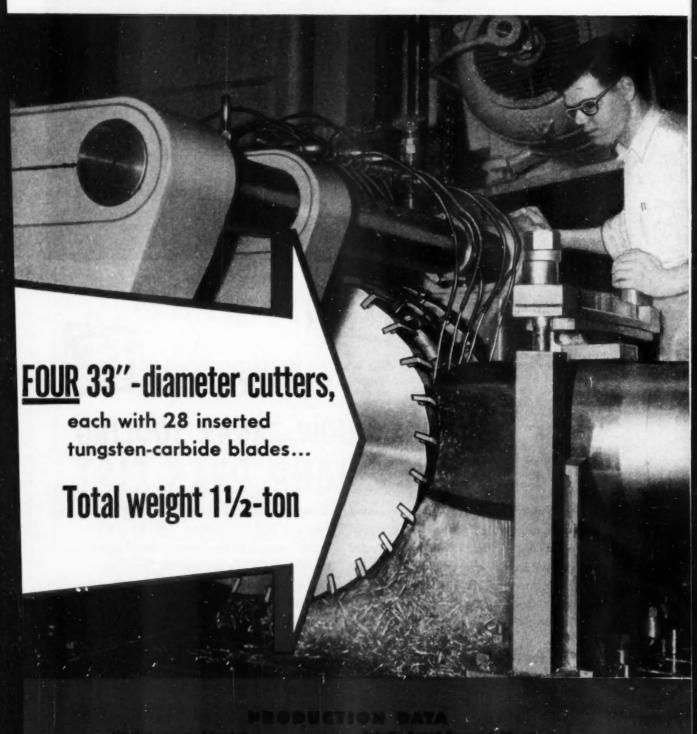
Ask on your letterhead for Bulletin "U-10." ZAGAR TOOL, INC.

24000 LAKELAND BOULEVARD . CLEVELAND 23, OHIO



TOOLS FOR INDUSTRY and SPECIAL MACHINERY

Reducing diet



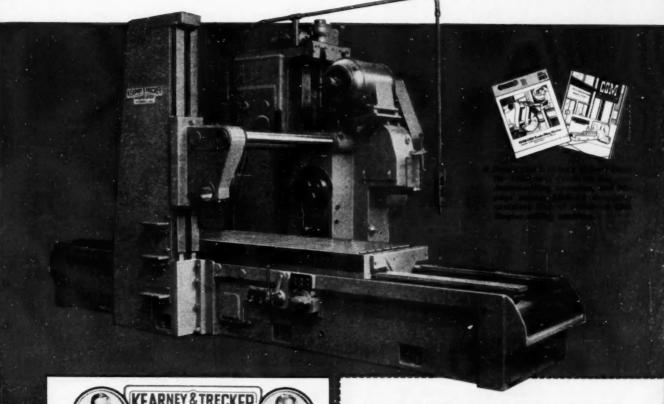
for 4-ton forgings

Kearney & Trecker's Bed Type, Model CSM milling machine removes maximum metal with four tungsten-carbide cutters

Here's your answer for increased capacity in the production-milling of large workpieces, like these 4-ton forgings.

It's the Kearney & Trecker 4208 CSM Bed Type Simplex machine. Because of its rugged construction and transmission of maximum power at the cutting tool, it was selected for milling both sides and a middle slot on 4-ton aircraft landing struts. A special 50-hp quill type spindle head with a low-speed range of 6 to 30 rpm is used to drive four 33" dia. side-milling cutters, each with 28 inserted tungsten-carbide blades. Outstanding machine features include unit construction, combination 30" dia. spindle gear and flywheel, counterweighted head, double overarms for rigid arbor support and independent motor drives for spindle, feed, rapid traverse and coolant pump-

The machine upright, which carries the spindle head is of a full box-section construction with large way surfaces, designed to absorb vibration from the heaviest cutting loads. Rigidity to the large-diameter cutters is also provided by a heavy-duty outer arm brace.





Special Machinery Division

MILWAUKEE 14, WIS., U.S.A.

KEARNEY & TRECKER CORPORATION, Special Machinery Division 6784 W. National Avenue, Milwaukee 14, Wisconsin

Please send me Data Sheet No. 1032 and 20-page catalog SMD-10. ☐ Check here if you would like to have a representative call on you as soon as possible (or call Milwaukee, GReenfield 6-8300).

Name
Title
Company
Address

ity.....Zone.....Sigte....

TO PREVENT VIBRATION trouble later...

... See KORFUND NOW!

Korfund Steel Spring Vibre-Isolater installed without beling to the floor under these presses at Wells Specialty Cempany, Inc., North Liberty, Indiana, permit rapid rearrangement of production lines. Effective Korfund Vibration Central also permits press operation at cansiderably higher then roted speeds without vibration—semething the simple felt pads previously used by Wells Specialty Cempany could not do. (Since the 200 ton press at left requires a pit for its pneumatic cylinder, the Vibre Isolaters are installed below floor level.)





A Four-Time Loser! After four different schemes for controlling vibration of their 180 ton capacity press were tried at a cost of well over \$1,000.00, without success, Sterling Industries Inc., Philadelphia, called in their local Kerfund representative. Four standard Kerfund Steel Spring Vibra-Isolators installed directly under the press solved the problem. Total cost—\$332.00.

ALL KORFUND STEEL SPRING VIBRO-ISOLATORS HAVE ADJUSTABLE LEVELING BOLTS...A KORFUND FEATURE FOR OVER 30 YEARS!

When dishes rattle and plaster cracks in homes near your plant, as happened in the two cases described above, you know your vibration control equipment is not effective. Usually your neighbor's attorneys will suggest you do something about it. Many problems such as this, as well as those involving interference with precision machinery in the plant, damage to the building structure or the press itself, etc., are brought to Korfund for solution.

We usually find the trouble lies in depending on one type of Isolator to do the job. We believe one product or even one type of product cannot solve all vibration problems efficiently and economically. We make several different types—each one designed for a particular set of conditions.

That's why when you bring your vibration problem to Korfund, you get our impartial recommendation on isolation media whether it be springs, rubber, or cork—alone, or in combination. We have all three—we favor none. Our only interest is your satisfaction.

For your free equipment isolation Selector Chart and additional data on increasing production and reducing costs, write for your copy of Bulletin 21, or see our catalogue in Sweet's Files.

For specific recommendations, contact us or your local Korfund office. A half century of experience is at your disposal.



News of the MACHINERY INDUSTRIES

(Continued from page 88)

in American made tools. U. S. producers exhibited lathes, milling machines, gear shapers, grinders, sanders, polishers, presses, drop hammers, testing equipment, chamfering machines, planers, hobbers, tools, and accessories. Acme, Bardons and Oliver, Cleveland, Curtis, Leece Bradner, Springfield, Brown & Sharpe, Henry and Wright, Gleason, and Sheffield were some of the American firms represented at the huge show.

A large number of English firms, in addition to displaying conventional machinery, showed a great deal of special equipment. In addition to the large French display of heavy equipment, there was a Saar exhibit of tools and accessories.

It was noted at the show that Belgium had the largest number of exports in comparison with its total productivity. Belgium exhibits comprised primarily boring machines and milling machines.

A great many precision machine tools were displayed by Switzerland—70 per cent of Swiss production is exported. Much interest was shown in the Swiss boring machines and hydraulic copying machines, as well as gear shaving equipment.

Since the exhibition was held in Italy this year, there were, of course, a great number of Italian machines on display. One interesting Italian display was staged by Fiat, who exhibited an assembly line conveyorized unit for engine manufacture. Another interesting exhibit was the Minganti lathes with automatic program selection. The German machine tool industry, which has about three to four times the productive capacity of the Italian builders, had many precision tools in operation. The German machines were said to be very complex for their size.

LITERATURE .

MARKETING OF AUTOMOTIVE PARTS, published by Automotive Service Industries Committee, 111 W. Washington 8t. Chicago 2, Ill. Price, \$25.06. This study covers all facets of the service industry. Featured sections include comprehensive studies on the market job to be done; the marketing structure; patterns of competition for repair service; marketing structure of selected product groups; the vehicle manufacturer as a marketer of parts; the wholesale structure; and competitive, functional pricing.

IF IT'S PETROLEUM-POWERED

there's a Globe built batter . . . right from the start



Because contractors measure fast, sure starts in dollars...

Caterpillar uses GLOBE batteries for CAT-built machinery

. . . that's important news to makers of automotive equipment!

The wealth of experience gained by Globe in building super-performance batteries for Caterpillar means your products are *right from the start* when you use Globe-built batteries.

Caterpillar is now celebrating its 50th Anniversary as a manufacturer of tracktype power. The Globe-built batteries used on CAT-built machines have to "take it" under heavy, daily pounding ... deliver dependable starting power in all extremes of weather. This experience has helped Globe to develop a superior heavy-duty battery for all petroleum powered equipment.

By specifying Globe-built batteries you can contribute to more dependable, more satisfactory performance of your equipment. And your customers will know that you offer nothing but the best.

Our congratulations!

Our Congratulations!



GLOBE UNION INC



EMERY force-measuring systems

Emery load cells offer the fundamental solution to any force-measuring or weighing problem.

Operating on simple, basic physical principles, Emery systems are maintenance-free. Some units have been in service over 25 years without even recalibration!

RANGES: 0-10,000,000 pounds . . . ACCURACY: 1/10 of 1% of range . . . RESPONSE: less than ½ second . . . TYPES: self-contained hydraulic, open-flow hydraulic, pneumatic . . . CELL DEFLECTION: less than 0.005" . . . APPLICATIONS: Weighing, Jet Engine Thrust, Brake Testing, Torque Measurements, Strength of Materials, Process Control, Tank Weighing, Platform Scales, Etc.

Since 1872, Emery Force-Measurement Systems have been lowest in initial cost, in operating cost, and require no maintenance.

Write today for information on stock or specially designed systems to solve your force-measuring problems.



THE A. H. EMERY COMPANY, NEW CANAAN 8, CONN.

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NA	W8
-	ITION

Preview of NATIONAL METAL SHOW

(Continued from page 74)

has been selected to receive the Medal for the Advancement of Research in recognition of his consistently sponsored metallurgical research and development programs over a period of years, and by his foresight and influence in making available financial support that has helped substantially to advance the arts and sciences related to metals. Mr. Umstattd has been chief sponsor for fundamental research at Timken and many new products have resulted from this work. Among the new developments is the 16-13-3 nickel-chromium-molybdenum steel, the first austenitic composition to be accepted for extensive application is solving problems in high temperature strength.

The Albert Sauveur Achievement Award will be presented to Alexander L. Feild, associate director, research division, Armco Steel Corp. The purpose of the Award is to recognize pioneering metallurgical achievements which have stimulated organized work along similar lines to such an extent that a marked basic advance in metallurgical knowledge has been made.

Three important and practical panel sessions on furnace atmospheres and induction heating will be presented by the Industrial Heating Equipment Association under the auspices of the American Society for Metals

Atmospheric gases, the control and safety in connection with these gases, and induction heating will be covered in these three panel sessions, the first of which will be held Tuesday morning, November 2, at the Palmer House. The second and third will be presented Tuesday and Wednesday afternoons, November 2 and 3, at the International Amphitheatre.

The Industrial Heating Equipment Association has made many vital contributions to the advancement of metals and it is the desire of ASM to provide a means of communicating these progressive developments to a wider audience. The entire IHEA program has been prepared by the Public Relations Committee of the Association, C. H. Stevenson of Lindberg Engineering Co. is Chairman. Committee members include C. H. Vaughn of Electric Furnace Co.; C. F. Olmstead of Lee Wilson Engi-



Beyond the blue ... up to the star-flecked blackness that surrounds the earth ... and at speeds that leave sound behind! Vital to the jets pioneering these new frontiers of aviation are CECO Engine-Driven Gear Pumps ... high performance main and emergency fuel pumps for the world's most advanced engines. Whether for turbo-prop or turbo-jet engines, CECO gear pumps assure accurate control of fuel flow for peak power and dependability.

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FAIRFIELD

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Lafayette, Indiana

neering Co.; H. M. Heyn of Surface Combustion Corp.; William Adam, Jr., of Ajax Electric Co.; William Benninghoff of the TOCCO Division, Ohio Crankshaft Co.; and A. E. Tarr of the Leeds & Northrup Co. President of the Association this year is L. H. Gillette of the Westinghouse Electric Corp. and the Executive Vice-President is Carl Ipsen.

Reports on the latest advances in welding and its uses will be featured at the National Fall Meeting of the American Welding Society. Fifty-seven papers covering all phases of welding activity will be presented in the 19 sessions to be held at the Sherman Hotel.

Fifteen hundred welding and production engineers, designers, technical management personnel and others interested in welding are expected to attend. They will hear papers by top authorities on the welding of titanium, zirconium and molybdenum, the use of welding in the production of aircraft and rockets, welding high temperature materials, inert-gasshielded arc welding, resistance welding, and fused metallized coatings.

Other papers will cover the relatively new "contact" type of electrodes, latest methods of hard surfacing, new developments in arc and oxygen cutting of metals, and recent advances in copper and silver brazing. There will also be sessions on welding pressure vessels and piping, weldability, structural welding, flame descaling, and welding in design and production.

A highlight of the technical sessions will be the Adams Lecture on Monday morning, to be presented by William L. Warner of Watertown Arsenal. His subject will be "The Toughness of Weldability." At this honors session a number of other prize awards will be presented to individuals for outstanding contributions to the advance of welding. On Monday evening, the annual President's Reception and National Dinner will be held.

The Metals Division of the Special Libraries Association will present its fifth annual program at the National Metals Exposition and Congress. A staff of technical literature specialists, located at Booth 802 of the Exposition, will offer on-the-spot reference service to all attending the convention. Free reference material—contributed bibliographies, SLA literature and reprints, will be distributed. Periodicals and Government publications, new technical books and

(Turn to page 190, please)

another ROGERS innovation



"Tepee" test of paper-base laminates, with ten-inch flame applied for two minutes.

At left, standard grade continued to burn after flame was removed. It was completely destroyed. At right, flame-resistant Rogers grade extinguished itself in less than eight seconds and retained most of its structural strength.



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MADE FLAMERESISTANT

BY WORK-HORSE, we mean our paper-base laminates, which are now available with exceptional flame-resistant qualities: The main purpose of these materials is to reduce costs in applications that now require glass-base laminates.

We have also added flame-retardant properties to our DUROID 800, a fibrous insulating material, listed by Underwriters' Laboratories as suitable for the sole support of current carrying parts. DUROID 800 is also self-extinguishing, but will not withstand as severe burning as our flame-resistant laminates.

Since industry-wide specifications for flame-resistant or flame-retardant materials do not exist, each of these Rogers materials should be assessed in terms of your application. Complete data are available, and we will be glad to supply samples for your own testing purposes.

Please write Dept. A. Rogers Corporation, Rogers, Connecticut.



INFORMATION WITH A LIGHT TOUCH . . . Please write for "Here's Rogers Again." It will help you appraise our company's place in your plans — at seconds-per-page speed.

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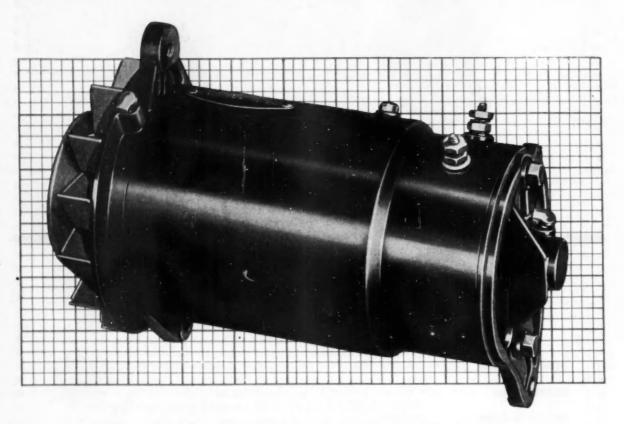
Rogers specializes in combining fibers and chemicals to produce Fiberloys that meet special material requirements. We welcome problems that existing materials can't solve.

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ROGERS, CONNECTICUT

Progressive Engineering

EFFICIENT NEW DELCO-REMY 12-VOLT



When today's stepped-up engines called for faster cranking and better ignition performance, Delco-Remy was ready, with a complete 12-volt electrical system, comprising new, balanced units—battery, cranking motor, generator, coil and distributor.

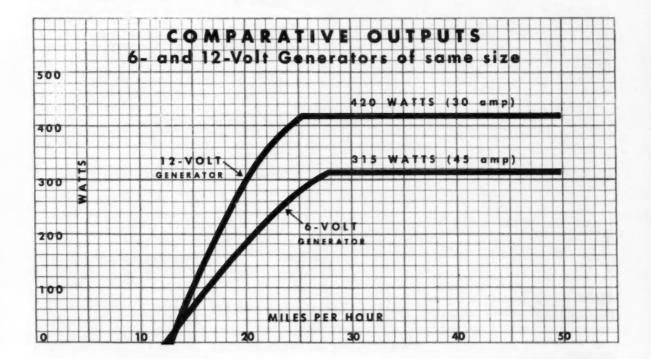
Delco-Remy's new 12-volt generator is identical in size and appearance with the previous 6-volt generator—but packed inside is the ability to produce at least 30 per cent *more output*. This designed-in ability permits the new 12-volt generator to supply the need for more electrical energy for radio,

heater, additional lights, transmission control, electric windshield wipers, window and seat controls and the multitude of other units requiring electrical power to operate them—as well as to keep the battery properly charged for faster cranking and better ignition performance at every engine speed. Note, too, that the new generator delivers more output at lower car speeds—an important battery-saving bonus feature when prolonged slow driving is necessary.

The basic technical reasons for this remarkable performance may be stated simply—

Makes the Difference

GENERATOR FOR PASSENGER CARS DELIVERS UP TO 30% GREATER OUTPUT



stronger fields, less field distortion from armature reaction, and a lower percentage of internal voltage drop. These important gains are made possible by the use of new field coils containing more turns of smaller wire and a new armature with 60% more conductors in smaller slots, giving more tooth area.

This generator for passenger car 12-volt electrical systems is only one example of how Delco-Remy's Progressive Engineering keeps always abreast—usually ahead—of developments in the automotive industry. When the need arises for even more advanced automotive equipment, you know that Delco-Remy will be ready.

Delco-Remy

DIVISION, GENERAL MOTORS CORPORATION, ANDERSON, INDIANA

AUTOMOTIVE, TRACTOR AND MARINE ELECTRICAL EQUIPMENT

The Ultimate in Labeling



Colorful anodized aluminum for permanent identification



TOUGH

Metal-Cals withstand extreme surface abrasion—are ideal under the most adverse conditions. They are thin, tough, modern nameplates with no projecting rivets or screws.



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Metal-Cals meet all government requirements for permanent adhesion in extreme heat and cold. May be used under any conditions, from -62°F. to 300°F.



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come in a variety of

attractive colors—matte or shiny finish—any size or shape.

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apply easily and
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eliminates drilling, screws, rivets, pins

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legibility of the finest lettering or diagrammatic detail.

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Company

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City_____State___

*T.M. Reg. U.S. Pat. Off.

(Continued from page 186)

SLA publications will be displayed as a guide to trends in technical literature. A three-day program has been arranged by a special committee under the chairmanship of Charles Wolfenberger of Acme Steel. It opens on Wednesday with a guided tour of the John Crerar Library of Chicago. Librarian Herman H. Henkle will explain library policies, followed by a panel discussion by staff members.

MEN in the NEWS

(Continued from page 41)

Goodyear Tire & Rubber Export Co.

—A. G. Cameron, vice-president and general manager, has retired, and F. R. Magennis succeeds him.

Glass Fibers, Inc.—S. Austin Marquis has been made Detroit regional sales manager.

Resistoflex Corp.—Carl A. Carlsen has been made aircraft sales manager.

Chrysler Corp.—Kermit A. Pickett was chosen manager of the divisional Records Development Dept.

Joseph T. Ryerson & Son, Inc., Ryertex-Glyco Div.—Harry E. Anderson has been made Seattle plant representative.

Convair Div., General Dynamics Corp.—J. D. Donaldson has joined the Commercial Sales Dept. as sales engineer.

Lockheed Aircraft Corp.—Steadman Teller has been made senior military advisor in the Dept. of Development Planning.

Aluminum Co. of America—William D. Mathers has been named assistant manager of forging sales.

Gar Wood Industries—H. H. Hippler is now director of sales and service administration.

Chrysler Corp.—Maurice J. Harris is now Eastern sales manager; Walter E. Foraker, central sales manager; C. R. Curtan, mid-western sales manager; and Charles B. Neely, far-western sales manager.

Chambersburg Engineering Co.— C. D. Galloway, Sr., has been chosen special consultant on automatic handling systems for the Chambersburg impacter.

Rotor Tool Co.—Charles E. Vanderpool has been promoted to sales manager

Pastushin Aviation Corp.—Barry B. Willis has been appointed vice-president of operations.

National Motor Bearing Co., Inc.

V. L. Peickii has been appointed director of research.

EF

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PRODUCERS and PROCESSORS
of metals and metal products



General view of the research department showing several of the continuous and

From our fully equipped research department we can determine accurately—from test runs—the combination of temperature, time cycle, almosphere and other factors needed to produce the exactly desired result,—assuring—in advance—the efficient performance of Effornaces fully up to specification.

Many large companies have drawn liberally upon this department in developing new products, and new techniques. Our facilities are available to YOU also—for YOUR research or development work, either gratis or for a moderate fee, depending upon the nature of the experiment. We will be glad to schedule time for your technicians, or write today for our 12 page booklet, "Research Facilities". It describes the equipment we can place at your disposal.

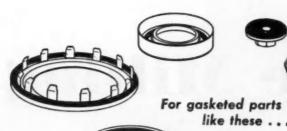


View of combination gas-fired and electric continuous furnace equipped with flame preheating burn-off or oxidizing section and controlled heating, soaking and cooling zones, for producing various surface coeditions on strip.

Gas-Fired, Oil-Fired and Electric Furnaces

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This FREE BOOK CAN HELP YOU CUT COSTS!

There's something new in this year's cars . . .

IT'S THE DAREX Flowed-in GASKET PROCESS!

And this fact-filled brochure gives you the whole Flowed-in Gasket Story. Here are a few samples of the things you'll read in this informative new book:

ABOUT COSTS

Using the DAREX Flowed-in Gasket Process, a major manufacturer is saving \$50,000 per year in labor and materials on a single gasketing operation. As a result of this striking cost reduction, the firm has recommended the DAREX Process for several more gasketing operations.

ABOUT THE PROCESS

The Flowed-in Gasket Process is a new application of a method of sealing developed by Dewey and Almy researchers over 30 years ago, and successfully used in food container manufacture ever since.

The DAREX Flowed-in Gasket Process is more than a sealing compound . . . more than a machine . . . more than an engineering service . . . it's a complete Process! So when you switch to Flowed-in Gaskets, you get all three.

Compounds—Over 800 formulations available to meet most needs. Or Dewey and Almy chemists will develop a "job-tailored" compound for you.

Machines— To apply the compound, Dewey and Almy designs and builds machines based on more than 30 years' field experience.

Service—Every machine is precisely adjusted to your specifications before it leaves the shop. When it arrives, a Dewey and Almy Engineer is on hand to install and adjust the machine. Then he trains your operators to full proficiency. And whenever you need him, the Dewey and Almy Man is at your service.





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Multiple Milling

Where you have work pieces to be milled on two sides, you can mill both sides on NEWTON VERTICAL ROTARIES in the time required to mill only one side by using double-row fixtures.



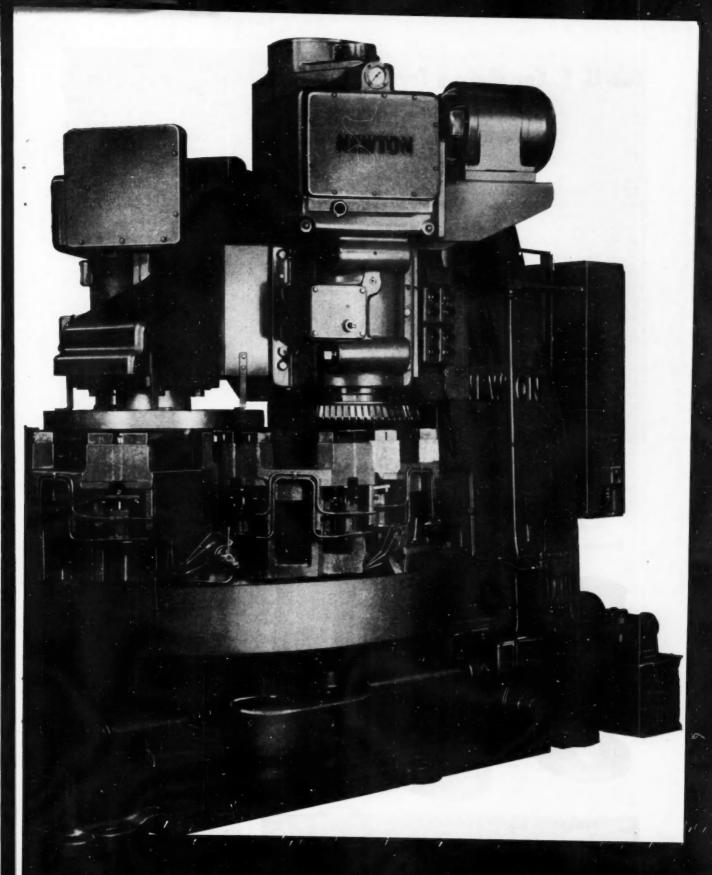
This 76 Inch NEWTON VERTICAL ROTARY with double-row fixtures continuously roughs and finish mills two sides of a piece in one pass under the cutters.

The fixtures (hydraulically operated) automatically open and close as the table turns.



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Two U. S. Car Makers Try to Make Deal for Plants in Brazil

By L. M. Peppercorn

RIO DE JANEIRO URING recent weeks two prominent personalities of the American automobi'e industry visited Brazil to establish personal contacts with official and private people in view of

the possibility to manufacture trucks and automobiles in this country. The first to arrive was R. A. Hutchinson, vice-president of Studebaker Corp., who after a few days' stay in Rio de Janeiro, went to the Studebaker's

Brazilian plant in São Paulo. No details of any future manufacturing plans could, at that time, be made known, owing to the fact that studies had not yet been completed. However, it was Mr. Hutchinson's opinion that of the 500,000 trucks which he thinks Brazil would need, Studebaker could supply about 20 per cent.

Henry J. Kaiser, in the company of Lesseps Morrison, Mayor of New Orleans, and Mario Bermudez, Director of the International House, spent several days in Brazil on their trip through some Latin American countries. Kaiser, when conferring with government officials, as also when contacting the public, spoke of his intention to produce 50,000 cars annually in Brazil. He also expressed his desire to bring to Brazil the necessary equipment since—as he declared—he is in position to transplant immedi-

Just at presstime, it was

announced that Mr. Kaiser had concluded a contract with the Argentine government to manufacture cars, jeeps, and trucks in that country. The sum of \$10 million, or about one-third of the capital, reportedly will be invested in machinery. Work on construction of a plant will begin shortly, and full production is expected to be reached within three years.

ately one of his factories, completely equipped to start production directly after it has been assembled. Kaiser said that he is thinking of making four to five different types of cars which will be destined for the internal market as well as for exports within South America and to the United States. He added that through the Kaiser outlets in the U.S. the cars, not absorbed on the Brazilian market, would be placed in the United States.

Kaiser predicts the possibility to produce a 100 per cent Brazilianmade automobile with his assembly lines. Brazil will thus not only save foreign currency on imports of some parts, but considering the export potentiality Brazil will economize about one hundred million dollars.

Volkswagen and Mercedes Benz projects for manufacturing in Brazil which were submitted to the subcommittee of jeeps, tractors, truck and automobiles - members of this sub-committee work as consultants to the Committee of Industrial Develop-



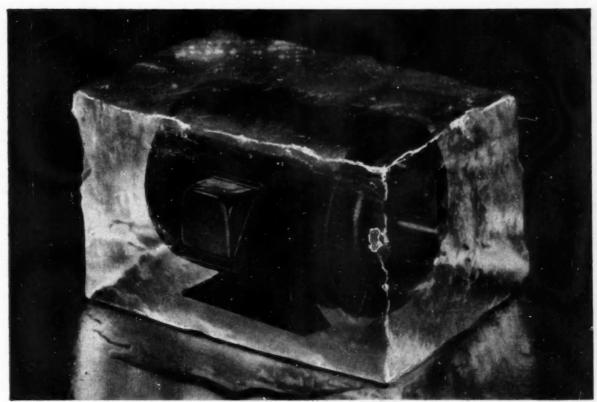
Higher horsepower and higher compression put heavier loads on the tappets. Johnson quality assures you the performance you want from these vital engine parts.











Let this unique illustration convey to you the remarkable cooling effect of Howell's new internal ventilation system in Series 100 Motors.

New Howell re-rated motors run cooler...last longer

Your motor needs have changed just as your machines have changed. Here are completely new motors . . . designed and built to meet today's requirements!

Now! Howell brings you everything you want in a re-rated motor: smaller size and lighter weight . . . plus better cooling for less maintenance and longer life.

Howell Series 100 re-rated motors feature a new internal ventilation system that provides 50% more contact between cooling air and active lamination materials. Temperature ratings are easily maintained; overload capacity is increased.

Many New Features

Series 100 Motors offer many other advantages: They take up less space—up to 30% less in some sizes; both open and totally enclosed fan-cooled motors have same diameters. They

perform better — Howell uses dependable copper rotors for higher conductivity, greater flexibility; new Mylar* slot insulation is thinner (more space for copper windings), yet eight times stronger. They last longer — better cooling, double-shielded bearings and super tough steel frames and feet, with cast iron endplates, insure extra years of trouble-free performance. They fit

your special needs — Howell provides rotors in three diameters for each frame size; corrosion-resistant materials and fittings are available to meet your specific industry problems.

Before you buy any re-rated motor, compare Howell Series 100 Motors for modern design, outstanding performance, and engineered precision. Howell will continue to make a complete line of regular and special motors – we have in our files more than 20,000 electrical design specifications! Let us serve you. Call your Howell man today.



MOTORS FOR INDUSTRY SINCE 1915



cap screw went to market

These two cap screws look alike . . . but only one was shipped. Chandler subjects every part produced to the most rigid testing and delivers only those which fully meet all specifications. You can be sure that every cap screw shipped by Chandler has high tensile strength and maximum resistance to stress, vibration and shear.

Chandler can mass produce the cap screws you need to your specifications. They specialize in automotive, Place self-locking, connecting rod and aircraft engine bolts in high carbon alloy and stainless steels. They are prepared to produce special heads, drill the heads or shanks, and grind the bolts to tolerances as close as

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Send your prints to Chandler . . . every cap screw you receive will meet all your requirements,

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ment-had their projects rejected a few weeks ago. The companies were advised to submit other projects. It was said in the trade that the rejection was due to the fact that the two German companies had wanted to import a certain number of cars and use the profits made on the sales as capital investment for the establishment of a manufacturing plant. On the other hand the Commission on the Industrial Development in their first meeting after the new government came into being approved the project of the German firm Borgward do Brasil S.A. to set up a plant for the manufacture of trucks.

AIRBRIEFS

(Continued from page 106)

New VTO

The British have become the first to flight test a jet-powered vertical take off machine, a flying test stand developed by Rolls-Royce. The device consists of two turbojet engines with tailpipes burned through 90 deg to point downward. The exhaust contains vanes to permit directional control. The "airframe" is a simple structure of welded steel tubing with the pilot seated atop the machine. Bell Aircraft Corp. is developing a substantially more complete VTO machine using gas turbine power but it has not yet flown. It seems inescapable that every time aircraft design shows signs of "settling down" into fixed patterns, it suddenly erupts into radical new channels. VTO machines are now undergoing development in an endless variety of principles and show no signs of abating.

F-86K Back Home

The USAF has made a curious reversal of its field in award of a large production contract to North American Aviation for the F-86K Sabre jet fighter. This is the machine now in quantity production by Fiat in Italy for the NATO Air Force program. After more than a year of foreign production (ostensibly of a machine containing no secret parts), the Air Force has now decided to build it in this country. However, the all-weather radar equipment in the nose, supplied by Hughes Aircraft previously, will be provided by North American using a system developed in its own laboratories. The new model will mount four 20 mm cannon, replacing the six .50-gal machine guns so widely praised by Sabre pilots during the Korean war.

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◆ You know what you're getting when you buy alloy steels from U. S. Steel Supply. For with each lot you purchase, we furnish a personalized data card. This card charts the guaranteed minimum hardenability and gives analysis information and recommended tempering and working temperatures. You are thus assured of getting in full measure the tensile strength, fatigue resistance, ductility and toughness that your design requires. We can assure maximum machinability too, for we adhere to unusually strict metallurgical standards in the purchase of all our alloys.

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ered how alloy steels might contribute to your production of a better product at a cost that might be even lower than at present? If not, it will pay you to call U. S. Steel Supply. One of our salesmen will gladly study your specific problems and, if alloy steel will do a better job for you, he will recommend the best alloy and see that you get it promptly.

Call us for: USS Carilloy alloy steels—hot rolled rounds, cold finished rounds, squares, hexagons, "FC" (Free-Cutting) rounds; USS Carilloy Aircraft Quality hot rolled rounds and flats and cold finished rounds, squares, hexagons, flats.

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Watertown 72, Massachusetts

Gentlemen: Please send catalog covering all types of diaphragms for the automotive and aviation industries.

To	
Street	Zone
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Industry News

(Continued from page 108)

SAE Transportation Meeting To Show Truck, Bus Progress

Latest developments in the design, construction, and utilization of modern motor trucks and buses will be spotlighted at the SAE National Transportation Meeting, Oct. 18-20, in the Sheraton Plaza Hotel, Boston, Mass. Technical papers to be presented at five sessions will report development of electronic scales, which record load weights without halting buses, and of twin-engine, two-level inter-city motor buses.

The meeting is sponsored by SAE Transportation and Maintenance and Truck and Bus Activities, with the cooperation of the SAE New England Section. Throughout the meeting, a truck and bus engineering display will be held.

Five-Nation Car Show Attracts Heavy Crowd

Public interest in foreign cars is demonstrated at the Ford Motor Co.'s international automobile show at the Rotunda in Dearborn, Mich. Believed to be the first one-company international exhibit ever held in this country, the show attracted 4000 persons on one day alone during the first week it opened. Called "Ford Around the World," the exhibit features cars, trucks and tractors produced by Ford in five countries. It will hold the feature position in the Rotunda until mid-November.

Willys Produces 100,000th Jeep for Latin America

Willys Motors, Inc., last month (September) produced the 100,000th Jeep for Latin America, one of the company's best export customers. Keys to the vehicle were presented to John Otto Knohr, general manager of Castro Zeledon and Co., Ltd., Willys distributor in Costa Rica. Willys at present sells more than one-third of its export vehicles to Latin America.

Classified Advertisement

HEATING - COOLING PATENTS — 2,481,149—2,527,845—2,669,100. Promotion propositions solicited. Box 85, Automotive Industries, 5601 Chestnut St., Philadelphia 39, Pa.



In 1953 a leading Design trade magazine conducted a survey among 1902 manufacturing plants on the use of Internal Combustion Engines of less than 60 hp., as power components in equipment made for resale.

Projected returns from 42.6% of plants contacted showed an estimated 678 plants using engines in the stated category, representing total engine purchases of 2,727,216.

Answering the question: "Who makes the Internal Combustion Engines you Use?" . . . Wisconsin Motor Corporation received 132 mentions, as against 105 for the second place builder, 56 for No. 3, 51 for No. 4—in a list of 41 classified engine manufacturers.

This outstanding preference for Wisconsin Heavy-Duty Air-Cooled Engines (although limited to a power range of 3 to 36 hp. in a broad survey classification including ALL engines below 60 hp.) provides tangible evidence that "WISCONSIN" rates first among men who know engines best. We'd like to count you among them.





WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46. WISCONSIN

A 8080-1/3

over 60,000 ... and STILL GROWING

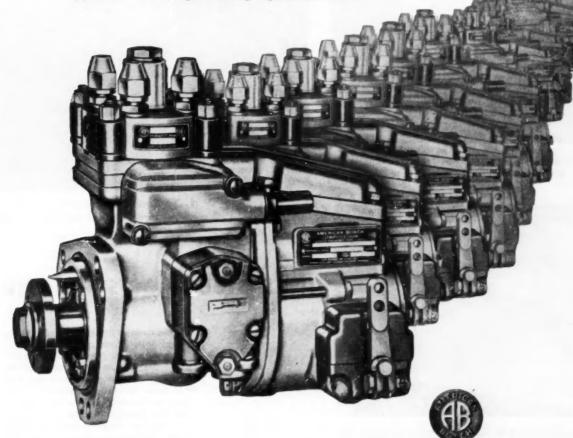
Over 60,000 American Bosch PSB single-plunger distributor-type Diesel fuel injection pumps have been produced since the pump was introduced several years ago.

Today, this simplified, lower-cost pump is being produced at a greater rate than ever before.

Here's definite proof of the acceptance of the PSB. It has literally revolutionized the concepts of fuel injection and made possible smaller, lower-cost Diesel engines... opening up new markets for Diesel power such as the farm tractor.

Tried and proved in the severest service, the PSB has rolled up remarkable records of performance—requires less maintenance—is easily serviced in the field. No wonder it has been hailed throughout the industry for its great contribution to Diesel progress.

American Bosch Corporation, Springfield 7, Mass.

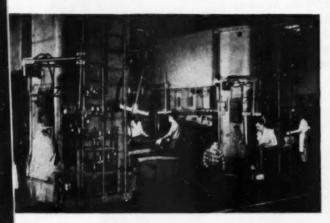


2402

AMERICAN BOSCH



1. Sheet Steel is drawn to the contour of an inner door panel in the 700-ton-ram double-action press, then progresses through . . .



2. Four More 600-ton presses that restrike, trim, pierce and give the panel final form.



3. Pressed and Welded to the outer door, the door assembly is completed so that it will fit neatly and hinge properly.

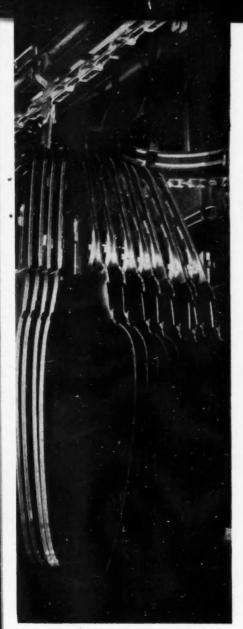


4. To Produce hundreds of smoothly contoured doors per hour takes perfect

This Steel Meets Automa

Automation is forcing steel to its severest test. Modern die engineering and streamlined press operations demand the best in sheet steel for high speed production. For example, take the giant 700-ton-ram double-action press at the entry end of an automobile door panel press line.

As fast as one door panel is drawn under tremendous pressure to the contour of the punch die, another panel is in position. From this first operation, the door panel passes through a series of four more 600-ton presses (photo No. 2) that restrike, trim, pierce and



teamwork between men, machines and cold rolled steel sheets. Read why . . .

tion's Challenge

give the door its final form.

At the delivery end of the press lines (photo No. 3), completed door panels are delivered by the hundreds per hour—each door gracefully styled and strong. Through all of these operations, the steel must exactly meet specifications that permit it to be drawn and shaped. It must be uniform throughout each sheet, and from sheet to sheet.

• Meeting The Test—Steel, to meet such rigid requirements, is not easy to make. That's why top auto producers buy steel from quality steel makers, such as Pittsburgh Steel Company, who have the know-how and modern equipment to produce inherent quality in cold-rolled sheet to meet automation's challenge.

This challenge is one of uniformity. To become a smoothly contoured automobile door with beautiful surface finish the steel cannot vary more than a few thousandths of an inch in thickness. Its chemical composition must be held to a few ten-thousandths of an ounce. The grain structure is controlled so that even a microscopic change would be evident.

The steel that goes onto production lines from Pittsburgh Steel, then, has been custom-built to do the job it is designed to do. It has proper internal qualities: exact chemical analysis, cleanliness, and fine grain size. It has the necessary external qualities: dimensional uniformity and surface cleanliness.

On high speed press operations, this means longer trouble-free runs and better quality in the end product. It minimizes the possibility of laminations, grainy surface, seams, buckles, wrinkles and tears, stretcher strains, and skin breaks—increases yield, speeds production and prolongs die life.

The inherent quality of the steel also assures a perfect surface when the door is disced and polished with fine abrasive. It requires less finishing, provides a clean, sound base for painting.

◆ How It Is Made—The story behind this quality sheet steel goes back to the materials that go into Pittsburgh Steel's modernized blast furnaces—the enlarged open-hearth furnaces—the new blooming mill—the new 66″ hot rolled sheet mill. Here, reverse rolling techniques, special high pressure water sprays, and electronic control of rolling temperatures impart a fine grain structure and smooth surface finish so that the steel can be properly cold-rolled.

The cold-rolling is done on Pittsburgh Steel's new 66" four-high, fourstand mill. It employs the most mod-



5. Finished Quality of the graceful style lines is assured as the surface is sanded and polished before painting.

ern electrical system ever installed on a cold mill to provide faster speed control of the rolls, tension control across the surface of the sheet and scientifically accurate gage indication—all designed to achieve the utmost in uniformity.

• Producing Quality—Fabricating operations everywhere in industry are becoming more and more dependent on quality in steel as the trend toward automation gains more momentum. Because automation not only means faster and lower cost production, but also better products for competitive markets, it is beginning to single out the producers of quality steel.

Pittsburgh Steel offers you the kind of cold-rolled sheet you need to meet your production line requirements, when and where you want it. Your orders get prompt personal attention from the time they are entered on the books until your product is completed.

If you are not now among those taking advantage of the savings this offers, why not call the nearest district sales office today? Write for your color brochure "The New Pittsburgh Steel Company."

"Everything New But The Name"

Pittsburgh Steel Company

Grant Building . Pittsburgh 30, Pa.

DISTRICT SALES OFFICES: Atlanta ° Chicago ° Cleveland Columbus ° Dallas ° Dayton ° Detroit ° Houston ° Los Angeles New York ° Philadelphia ° Pittsburgh ° San Francisco ° Tulsa Warren, Chio. PLANTS: Monessen, Pa. ° Allenport, Pa. ° Aron Los Angeles ° Unionville, Conn. ° Warren, Chio ° Worcester, Mass.

PRINCIPAL PRODUCTS: Hot and Cold Rolled Strip and Sheets * Strip Specialties * Seamless Tubular Products * Wire and Wire Products * Chain-Link Fence * Cargotainers * Steeltex



GE RAPID-FIRE PRODUCTION

from your PUNCH PRESSES



WITTEK

Automatic Roll Feeds

Wittek automatic roll feeds fit all makes and sizes of punch presses—provide maximum efficiency and extreme accuracy in the high speed automatic feeding of strip stock. Made in single roll, double roll, and compound types with straighteners, in models to feed

(push or pull) in any direction. Length of feed is easily adjusted to meet individual' requirements.



WITTEK Reel Stands

Simplify Handling of Coiled Stock
Choice of standard models to facilitate handling coiled stock . . . from small, light coils to those weighing up to 800 pounds. Larger reel stands automatically center the coils — provide frictional braking action to prevent overrunning, maintain uniform coil slack.

Write for Full Particulars WITTEK Manufacturing Co.

4319 W. 24th Place, Chicago 23, Illinois







(Continued from page 37)

Electric Auto-Lite Co. has obtained a loan of \$14.66 million to modernize manufacturing facilities, increase working capital, and for other corporate purposes.

Stockholders of Magnecord, Inc., have approved the purchase of all outstanding stock of Davies Laboratories, Inc. . . . Shareholders of Hydraulic Press Mfg. Co. have rejected an offer to buy the company's assets for \$4.3 million.

. . .

Electro Metallurgical Co. will build a \$31.5 million plant at Ashtabula, O., to produce at least 7500 tons of titanium metal annually. The Government has agreed to buy over a five-year period that part of the new plant's production not sold private industry.

Borg-Warner Corp. stockholders will meet Dec. 10 to consider a 3 to 1 split in the number of shares outstanding. The company recently extended its operations to the West Coast by acquiring Weston Hydraulics Limited of North Hollywood, Calif.

Sahlin Engineering Co. has opened a new plant in Birmingham, Mich., to specialize in automation machinery. . . . General Electric Co. will open its new welding plant at York, Pa., on Oct. 21.

Flex-O-Tube Div. of Meridan Corp. is now in production at its \$500,000 plant in Inkster, Mich. . . . Robertshaw-Fulton Controls Co. has broken ground for a new \$2 million plant for its Bridgeport Thermostat Div. at Milford, Conn.

Fred M. Young, president of Young Radiator Co., was recently elected director of the district for the Great Lakes Harbors Association.

Surface Combustion Corp. has established a deferred payment plan for purchase of the equipment manufactured by its industrial divisions. It is said to be the first such arrangement for financing large industrial furnaces and air conditioning equipment.

DOUGLAS AIRCRAFT LICKS A TOUGH ONE...

uses 800-400-ton
Bliss Hydro-Dynamic
Press to cut reject
rate by 68%

Faced with a better than 70% reject rate on 52-in. diameter aluminum shells, a west coast sub-contractor almost sunk the project and himself in the bargain.

The part required a difficult deep draw—and then halfway through the draw cycle—a stretch into the final shape. Despite the stretch, the wall had to be held to a close tolerance.

To solve the problem, Douglas and Bliss engineers collaborated on the design of a special Bliss Double-Action Hydro-Dynamic Press—one which has a 100% pin pattern on the blankholder to give positive holding pressure all around the blank. That feature, plus precision guiding of the slide and accurate tooling, did the trick...

Rejects were cut to less than 2%

You can expect results like that when you use the right press for the job. It may be a single, double- or triple-action press. It may require a rubber pad set-up. It may be a standard or a special-purpose press. But no matter what your problem, you can be sure of impartial counsel from your Bliss press engineer. Bliss, world's largest manufacturer of presses, makes both mechanical and hydraulic—grinds no ax for either—only for the one proper press.

HD-800 400-H-74-84 For HYDRAULIC Presses, too ... it pays to specify BLISS is more than a name...

E. W. BLISS CO., Canton, Ohio PRESSFS, ROLLING MILLS, SPECIAL MACHINERY

Subsidiary: The Die Supply Company, Cleveland, O. • E. W. Bliss (England) Ltd., Derby • E. W. Bliss Company (Paris) France'
U. S. Plants in Canton, Salem and Toledo, Ohio; Hastings, Michigan; and San Jose, Calif. Branch Offices in Chicago, Cleveland, Dayton,
Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo; and Taronto, Canada. Other representatives throughout the world.

it's a guarantee!

Perfect for nut forming



Photo courtesy of Decker Manufacturing Company



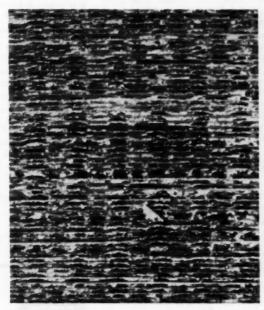
SCRAPLESS NUT QUALITY WIRE

 Youngstown Scrapless Nut Quality Wire is outstanding for its excellent surface and sound internal structure. This uniform high quality results directly from close control of manufacture-from the ore mines clear through to finished product. Thus customers can always be sure that Youngstown wire will stand up under the punishing operations of cold heading, cold punching and thread tapping.

THE YOUNGSTOWN SHEET AND TUBE COMPANY Carbon, Alloy and Yoloy Steel

General Offices: Youngstown, Ohio - District Sales Offices in Principal Cities SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - BAR SHAPES - WIRE -HOT KOLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - RAILROAD TRACK SPIKES

1150-hour salt spray test shows increased corrosion resistance with **Bonderite on aluminum**



UNTREATED. Unretouched photo of section of aluminum refrigeration air conditioner condenser after 1150 hours in salt spray. Note corrosion.



BONDERITE-TREATED. Unretouched photo of identical aluminum refrigeration air conditioner condenser after 1150 hours in salt spray. Note absence of corrosion.

If you want more effective bare corrosion resistance or increased durability for paint, treat aluminum and its alloys with Bonderite.

Special formula Bonderites have been developed and tested and proven thoroughly for this purpose. They form a thin, irridescent, remarkably effective integral coating with the aluminum in simple and economical operation. Solutions are sludgeless, easily controlled, and produce results of uniform high quality.

The Bonderite coating is flexible, withstanding

moderate draws without trouble. The coating conducts electricity, necessitating no change in arc and spot welding procedures. Bimetallic and galvanic corrosion resistance is high.

Bonderite for aluminum is shipped in concencentrated liquid form, easy and safe to handle and use.

Get complete information on this more effective protection for aluminum and its alloys. Write for bulletin on Bonderite 710 and 720.

*Bonderite, Bonderlube, Parco, Parco Lubrite-Reg. U.S. Pat. Off.

Since 1915 - Leader in the Field



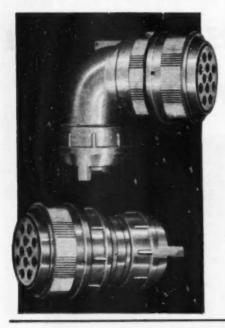
RUST PROOF COMPANY 2178 E. Milwaukee, Detroit 11, Michigan

BONDERITE

BONDERITE and **BONDERLUBE**

PARCO COMPOUND

Now! BENDIX-SCINFLEX waterproof plugs



for use with multi-conductor cables

These new Bendix*-Scinflex waterproof plugs are a modification of our standard AN type "E" (environment resistant) connector. They are designed to meet all "E" performance requirements when used with multi-conductor cables. Each plug includes a modified AN3057B cable clamp which provides inward radial compression on multi-conductor cablese This unique feature completely eliminates cable strain-a common source of circuit trouble.

In addition, there are gaskets at all mating surfaces and an accessory sleeve is available to accommodate an extreme range of cable sizes. A folder describing this new waterproof plug-and the various sizes in which it is manufactured-may be obtained by writing our Sales Department. *TRADE-MARK

SCINTILLA DIVISION

THESE BUILT-IN FEATURES ASSURE TOP PROTECTION AGAINST CIRCUIT FAILURE:

Shock and Vibration Resistant

Die Cast Aluminum Shell Cadmium Plate-Olive

> Drab Finish Maisture-Proof. Pressurized

High Arc Resistance, High Dielectric Strength Silver-Plated Contacts

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Send us your prints for quatation. Our experience stems from 40 years' service. Write for booklet - "Our Story

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MIMMANTERINE

S·O·S for Springs of Satisfaction for over 45 years



L. A. YOUNG SPRING & WIRE CORPORATION

GENERAL OFFICES • DETROIT 11, MICHIGAN
IN CANADA: L. A. YOUNG INDUSTRIES LTD. WINDSOR, ONTARIO

A completely modern Development Program specifically designed for your product...

Conducted by men with more experience in the developing and testing of aluminum products than any other group in the world!

One of Alcoa's research and development centers, this modern building is located in Cleveland, Ohio, and contains many of the testing facilities shown on the opposite page.





Aluminum truck wheels are an Alcoa development brought about by just such a program—as are many of the most recent improvements in aluminum pistons, bearings, cylinder heads, engine blocks, transmission and torque converter housings.

In many cases, the techniques learned in solving other problems may be applied to yours—with the savings in time and expense passed on to you! For information on setting up such a program for your own product, write: Aluminum Company of America, 1841-K Alcoa Building, Pittsburgh 19, Pennsylvania.



ALUMINUM COMPANY OF AMERICA

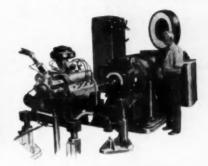




Typical of special test equipment built in our shops—this one for testing trailer floors.



Drive-in deep freeze for testing automotive parts in use at low temperatures.



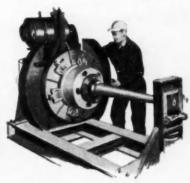
Electric dynamometer for testing internal combustion engines.



Fatigue testing machine applying fatigue loads to the skirt of a piston.



Vibrator table which accurately controls vibrations to check metal fatigue on automotive parts.



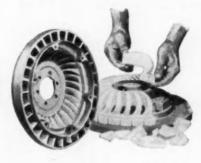
Wheel testing machine, designed by Alcoa, tests various types of wheels under simulated road conditions.



Whirl pit for testing rotating parts up to 80,000 rpm.



Stress analysis and fatigue test of diecast aluminum clutch housing.

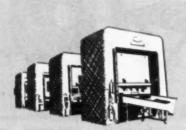


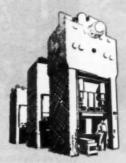
Automotive torque converter cast from special Alcoa-developed plaster cores.



This line of Danly Presses represents the most advanced thought in press engineering. Completely enclosed integral controls simplify installation, make operation more flexible. Both electrical and pneumatic controls are conveniently housed and accessible at floor level.







Danly offers any press you need for blanking, drawing or any secendary operation... single, double or triple action... overdrive or underdrive... to suit your plant layout. Make your press line a Danly line and save costs at every stage of your stamping operation.

Drawing COSTS LESS ON A DANLY PRESS

When you get a tough draw job . . . put it on a Danly Danly Presses reduce the cost of your drawing

operations by producing more stampings per shift. Their proved mechanical worth adds up to greater production, fewer shutdowns.

The line of Danly Underdrive Presses below is headed by a Triple Action Danly that actually doubles production. Eliminating what is normally a choke point, this Danly draw press is equipped with a special slide motion that permits faster stroking without exceeding safe drawing speeds. The output from this press keeps the whole line of secondary operation presses working steadily

At the left is another line of Danly Presses headed

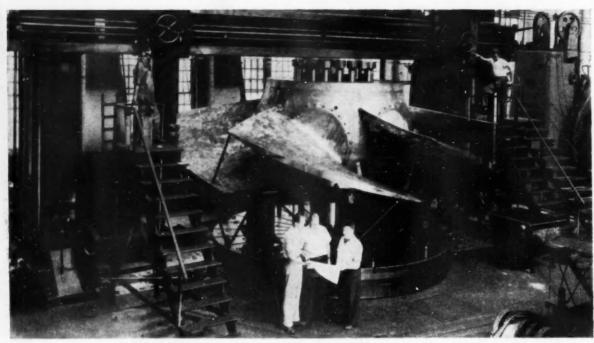
by a top drive double action draw press. This line represents the most advanced thought in press engineering. Totally enclosed and integral controls make installation practically a "plug-in" job. Operation is easier, safer—less maintenance

All Danly Presses are built heavier to stand up under continuous peak load operation. Automatic oil lubrication adds hours of production time to every working day. No matter what your stamping requirements are, Danly Presses will reduce your costs. Call a Danly press engineer today.

DANLY MACHINE SPECIALTIES, INC. 2100 South Laramie Avenue, Chicago 50, Illinois

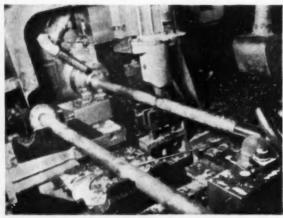
Danly Underdrive presses like these are the new answer to mass production of large stampings . . . they double output of the entire line, require less floor space and are designed especially for auto-

PRODUCTION INCREASES UP TO 30%



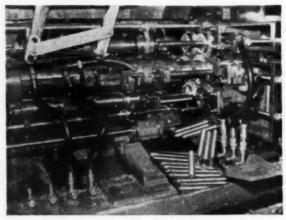
PROPELLER RUNNER. Grade 370 cut machining of tip contours on 165-ton runner from 220 to 65 hours. Carbide takes interrupted cuts through heavy scale at 3 times former speed, with 88% less downtime.

SETUP: Material—Welded high-tensile carbon steel (A 148-50 T, GR 80-50). Speed—154 SFPM. Feed—1/2 inch. Depth of cut—1/6 inch. Coolant—No.



TRUCK AXLE FORGING. Turning with Grade 350 resulted in 33% more pieces per tool. Chipping and flaking, encountered with previously used tools, were eliminated.

SETUP: Material—AISI 4150 steel forging. Speed—200 SFPM on 2-inch diameter; 400 SFPM on 4-inch diameter. Feed—0.014 inch. Depth of cut—16 to 1/8 inch. Coolant—Yes.



THREADED LEVELING SCREWS. Carboloy Grade 370 tools, used in 6-spindle Cone Automatic, boosted production to 944 screws per hour, compared to 140 with steel tools.

SETUP: Material—SAE B1112 one-inch diameter steel screw stock. Speed—1586 RPM for threading. Feed—0.005 inch for chamfering and cutoff. Coolant—Yes.

WITH NEW CARBOLOY SERIES 300 STEEL-CUTTING CARBIDES

Case histories prove Grades 350 and 370 outperform, outlast other carbides on tough steel-cutting jobs.

Carboloy Grades 350 and 370 are capable of cutting more cubic inches of steel per minute, with longer tool life, than any other carbides. This has been *proved* on in-the-plant applications, where these grades have boosted production as much as 30% over previous carbides used.

Grade 350 for medium-duty steel cutting, and Grade 370 for heavy-duty steel cutting, are of a new family of carbides, manufactured by an entirely new process.

Both grades have a built-in structural rigidity that enables them to operate at temperatures as high as 1800°F without the tip deformation found in other carbides. They combine superior wear resistance and extreme toughness to a degree never before possible.

Full stocks now available from Authorized Carboloy Distributors

Standard Carboloy Tools are available in Grades 350 and 370. In addition, blanks and inserts of each grade are available in a wide range of styles and sizes.

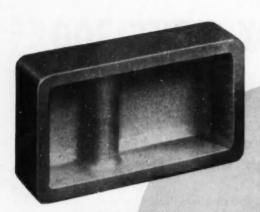
Carbides for any machining job. Regardless of your particular machining problem, a grade of Carboloy cemented carbide

is available to handle it. Over a quarter century of experience in machining ferrous and nonferrous, metallic and nonmetallic materials has been acquired by the Carboloy organization. See your Authorized Carboloy Distributor or Carboloy salesman for qualified, expert machining assistance.



"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

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Send new Price List GT-300, containing sp	ecifications and prices on new Grades 350 and 370.
Name	Position
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More reasons why...
HUNTER DOUGLAS



These Impact Forgings are shown three-fourths actual size

IMPACT FORGING

FROM

HIGH STRENGTH ALUMINUM ALLOYS

These aluminum thick bottom cans are illustrative of the endless variations in part geometry possible with Hunter Douglas cold impact forging.

All parts pictured were formerly produced machined from bar stock at great cost—now impact forged by Hunter Douglas to final print in one fast operation at low cost. The "no-draft" characteristic effectively eliminates machining. Simply trim to length, drill holes in base for attaching bolts and the part is ready for final assembly.

To the economies achieved through impact

forging can be added the superior physical properties resulting from this mass production technique perfected by Hunter Douglas. Increased fatigue properties are obtained and bending stresses at the inside corners are redistributed parallel to the flow lines rather than cross grain as would be the case if the part were machined from bar stock.

If you have a design problem that requires a similar part for mass production in quantities up to a million or more a month, remember the name, Hunter Douglas.

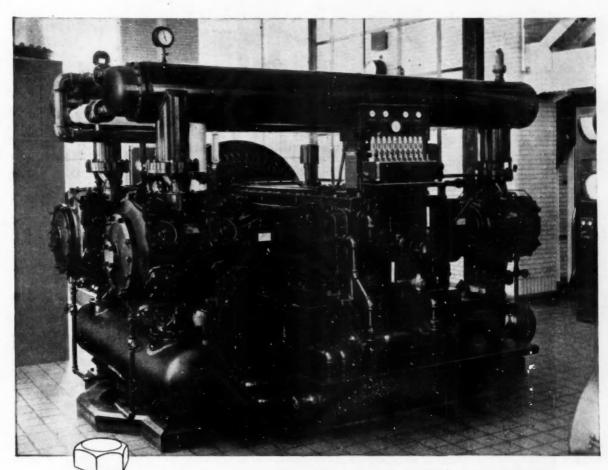
Our Research and Development Engineers welcome the opportunity to consult with you.



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JUST BOLT IT TO THE FLOOR that's all Ford had to do

Expanding operations at Ford Motor Company's assembly plant in Buffalo, N. Y. demanded additional shop air capacity. It had to

be installed quickly and, if possible, without disruption to existing facilities.

Inasmuch as the installation was to be on the second floor of the power house, Ford engineers selected a Clark CMA-4, 350 horsepower, Balanced/Opposed Compressor. The low installation cost was an important factor.

With the Clark motor-driven unit, it was unnecessary to run foundations all the way down to the basement. Piping, which was beneath the proposed compressor location, did not have to be moved.

Because of the perfect balance of the Clark

unit, it was possible to mount the motor and compressor on a steel sub-base which was bolted to floor I-beams. No foundations were required. No pipes were relocated.

... nor was there any lost production. The Clark unit was tied in over a weekend.

The Buffalo assembly plant is but one of many Clark Compressor installations serving the Ford Motor Company's vast operations.

Before you consider any proposed compressor location impossible, it may save you money to talk it over with your nearest Clark representative. In the meanwhile, make sure you have Bulletin 118 in your files. Write

CLARK BROS. CO. . OLEAN, N. Y.

Division of Dresser Operations, Inc.

Sales Offices in Principal Cities Throughout the World

PRECISION BY THE TON

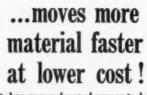


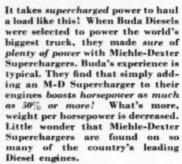
CLARK balanced/opposed compressors

150-4500 HP

Payload...75 Tons

World's largest truck uses MIEHLE-DEXTER SUPERCHARGERS





You, too, can keep pace with the race for more horsepower by using M-D superchargers on your engines. The investment is usually far less than required by other methods. Write for bulletin.



Dumping 75 tons of sand...or hauling copper ore up 18% grades from pit to crusher—that's the every-day job of these giant M-D supercharged trucks used by an Arizona open-pit copper mine.

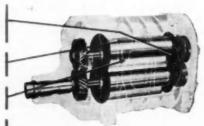
Only MIEHLE-DEXTER gives you all these features!

Internal construction uses patented rubber end plate seals. Eliminates metal contact, assures longer life, achieves fuel savings.

Special wear strips on rotors eliminate metal-tometal contact, assure longer wear.

Lightweight aluminum rators and housing boost power without adding weight.

Standardized parts allow easy field service.



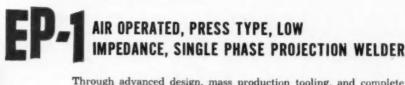


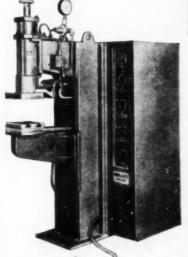
MIEHLE-DEXTER SUPERCHARGER

100 Pourth Strutt

FOR THE FIRST TIME A COMPLETELY NEW DESIGN OF SMALL, LOW PRICE SCIAKY WELDERS

Featuring all the Ruggedness, Dependability and Consistency of Operation Common to Sciaky Basic Thinking—Welders Designed to Do More Useful Work at Lower Operating Cost with Maximum Reliability!





Through advanced design, mass production tooling, and complete use of integrated parts, Sciaky is introducing a complete new line of competitively priced, small, standard projection and spot welders. Check these important design features

Check these important design features . . .

Pneumatic Double-Acting Cylinder Head
Recirculating Ball Bearing System Guided Ram
Side Mounted Sciaky Integral Control

Low Impedance Secondary Circuit
Sciaky High Efficiency Welding Transformer
Fabricated Frame with Heavy Vertical "T"

Fabricated Frame with Heavy Vertical "T" Slotted Columns

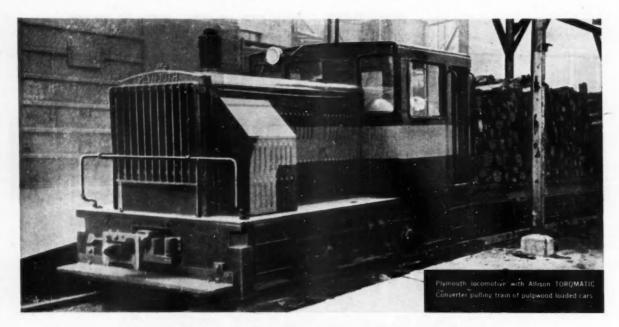
Heavy, Fabricated Lower Arm Silver-Plated, Laminated Flexible Shunt Conductor

For complete details and specifications on the EP-1 projection welder, or SP-1 spot welder, write for Bulletin 324-2.

Largest Manufacturers of Electric Resistance Welding Machines in the World



SCIAKY BROS., INC. * 4925 W. 67th STREET * CHICAGO 38, ILLINOIS



Shock-Free Power Transmission Saves \$500 a month

Production jumped almost 100% when, in December 1950, ene 13ton locomotive equipped with an Allison Torque Converter replaced two 12-ton trolley-type locomotives owned by West Virginia Pulp and Paper Company.

Immediate savings came to \$500 a month - the cost of a locomotive coupler. The trolley-type locomotives damaged an average of one coupler each month but smooth power transmission by the Allison TORQMATIC Converter eliminated this replacement

And by November 1953, savings in couplers alone paid for a second Allison TOROMATIC-equipped locomotive.

Maintenance on these two units is

"practically nil" because the Allison Converter automatically matches engine power to load demand, prevents engine lugging and drive-line shocks. Each unit uses less than 1 gallon of Diesel fuel an hour, pulls trains up 41/2% grades, works an average of 16 hours per day.

Savings on Other Types of **Heavy-Duty Equipment**

Allison TOROMATIC Converters and TOROMATIC DRIVES cut costs and boost production in a wide range of heavyduty equipment.

An Arizona mine gets 41% longer tire life on big truck tires costing \$1000 or more each.

A Pennsylvania dragline operator saves \$2160 a year on cable alone.

A western contractor gets 100% longer transmission life on off-highway

Get full details on TOROMATIC Converters, DRIVES and BRAKES for your units from your equipment dealer, manufacturer or write direct.

Allison Division of General Motors Box 894A, Indianapolis 6, Indiana

ALLISON TOROMATIC CONVERTER

Simple Design - one-piece cast converter elements - minimum

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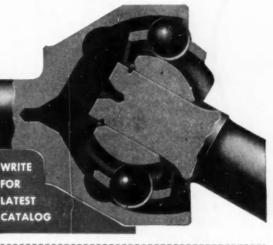
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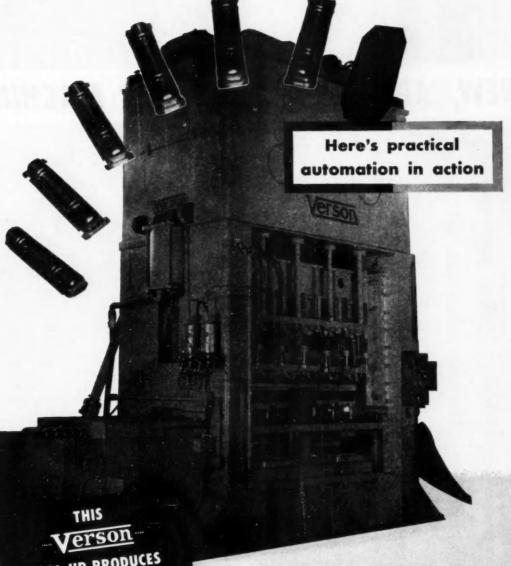
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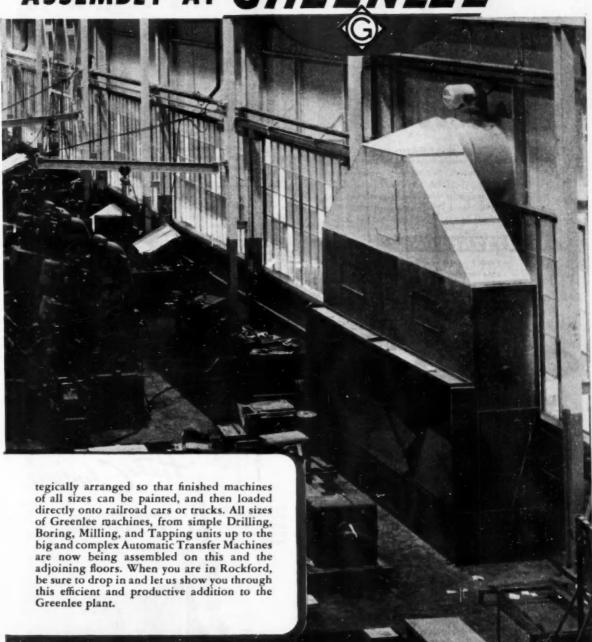
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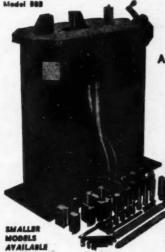
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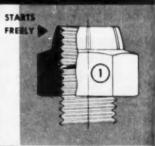
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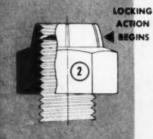
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with prevailing torque.....

The accompanying illus- STARTS trations, that were first used in our catalog published in 1944, tell the story of "HUGLOCK" selflocking nuts completely, almost without further explanation. It is a onepiece prevailing torque type, re-usable, self-locking nut. The tapered top portion of the nut is slotted to form six thread-

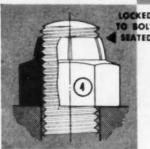




LOCKING ed segments. These are curved radially inwards to press against the bolt. BEGINS This creates a heavy inward and downward pressure, producing a friction lock, between the load carrying flanks of the nut and the bolt threads." The combined metal to metal hugging and locking friction is distributed over all of the threads, enabl-

ing "HUGLOCK" to grip LOCKED the bolt firmly, until re- TO SOLT moved by a wrench . . . UNSEATED The one-piece all metal construction and the continuous thread, extending through the length of the nut, provide maximum thread shear strength. The "HUGLOCK" principle can be incorporated into nuts of standard size, with standard threads or spe-





LOCKED cial sizes with special O BOLT threads . . . "HUGLOCK" STATED maintains its locking action, through repeated removals or re-use on the same bolt or a similar bolt of commercial thread tolerance. It locks to the bolt, whether the nut is seated or unseated. "HUGLOCK" eliminates axial thread play which tends to make a nut creep

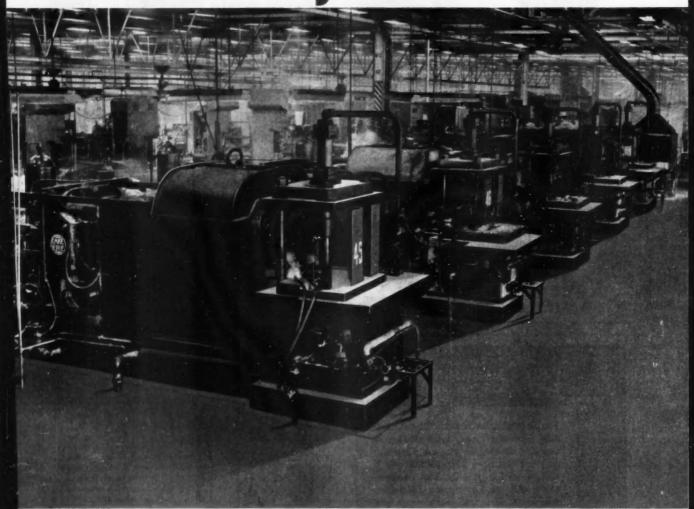
from its seat and work loose, under severe vibration or shock . . . All lack washers, cotter pins, key plates and other locking devices can be eliminated . . . The "HUGLOCK" section of our new catalog which is on the press, contains 24 pages. It includes complete information, specifications, engineering data and prices. It will be furnished upon request.

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"WEDGE CAM TOGGLE" The revolutionary Lake Erie "Wedge Cam Toggle" has provided a new standard of comparison for increased die casting production. This self-compensating toggle clamp automatically takes up clearances in the dies due to contraction and expansion of the molds during production or shut-down periods, and, at the same time, engages and disengages easily without binding. This is accomplished by the use of a circular cam contact surface together with rolls which guide the toggles during engagement and disengagement. The toggle action is actuated by a hydraulic cylinder which provides smooth, rapid opening and closing.

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To Die Casting Problems

by

LAKE ERIE

ENGINEERING CORP. BUFFALO. N.Y. U.S.A. ... these new die casting machines have increased production 15% to 25%

Lake Erie's patented "Wedge Cam Toggle" and "Pressure Pac" injection unit provide the industry with the first major improvements in die casting machines in many years. In addition to these two exclusive contributions to improved production, Lake Erie Die Casting Machines incorporate a number of other engineering advancements—all of which com-

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OPERATING FEATURES

Patented "Wedge Cam Toggle"

Self-compensating adjustment for heat expansion.

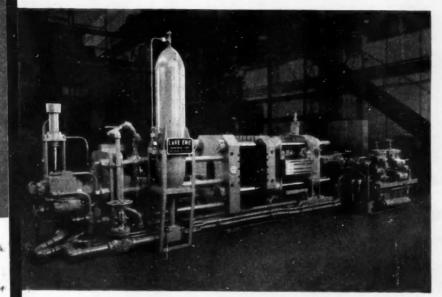
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Write for this Catalog

Illustrations, specifications, application data all are here in complete detail with full explanation of the patented "Wedge Cam Toggle" and "Pressure Pac" production advantages.



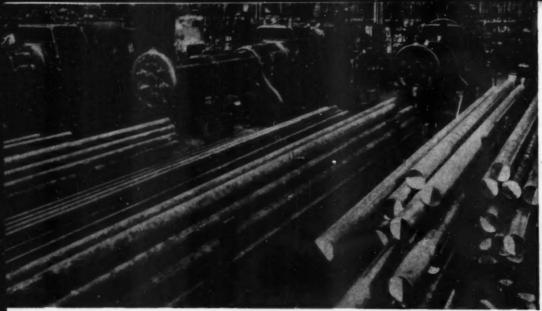
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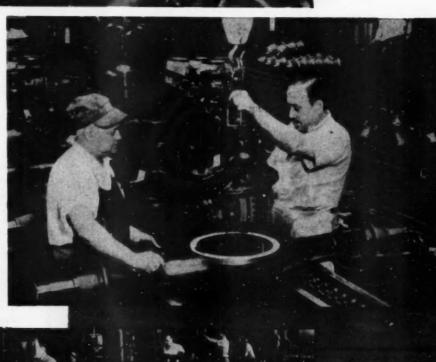
Idler and side pinion blanks are cut from alloy steel rounds in automatic bar machines. Teeth are then machined in the blanks, and the pieces are carburized, hardened, and finish ground.

RIGHT

Final assembly of a completed axle unit.

BELOW

After heat treatment, hardening, straightening, and grinding, axle shafts come to this machining line to be turned, spot faced and hobbed. These axles must withstand hard service in tractor-trailers, farm trucks, and dump trucks.



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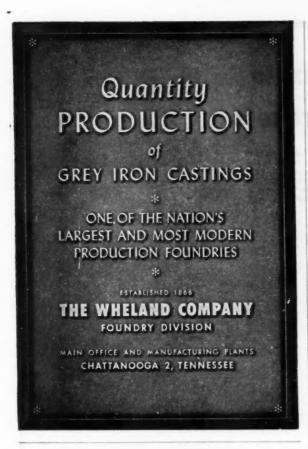


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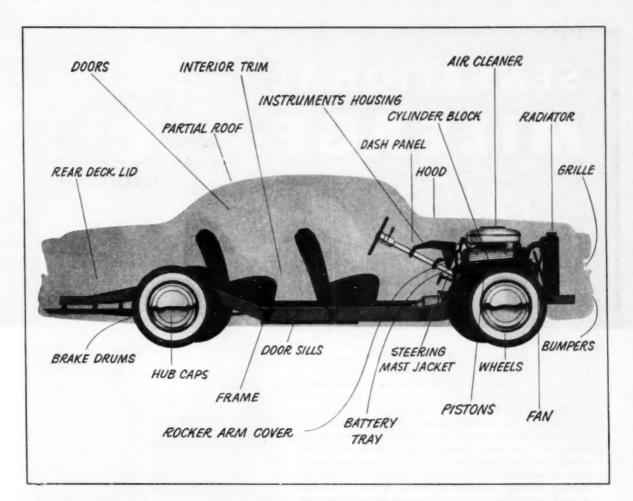
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Aluminum's lightness alone contributes to faster pickup and climb, more miles per gallon, and can lower the center of gravity. In addition, aluminum offers other advantages such as strength, heat conductivity, light and heat reflectivity.

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often at far less cost than other materials. It can be stretched, rolled, cast, drawn, forged, spun, stamped, extruded, and machined to make a wide variety of parts economically. And aluminum gives you a big price savings over other non-ferrous metals, because its light weight gives you up to three times more metal per pound.

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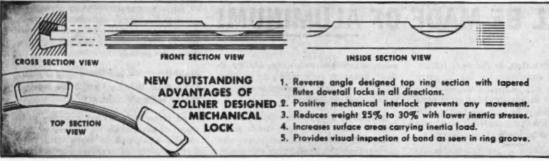
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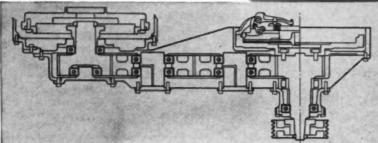
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at work in Dart's new monster

This dual-engine giant has two torque converters, two transfer cases and two reverse gear boxes in which New Departure applications are found. Cross section of transfer case shows seven ball bearings—all New Departures!





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SEATTLE 5000 First Ave. S. Londer 5920